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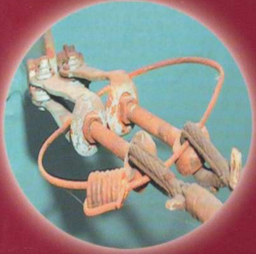

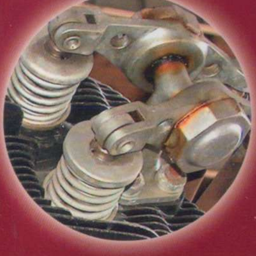

Polikarpov Po-2

Grzegorz Szymanowski

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Grzegorz Szymanowski,
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Korekta: Agnieszka Skrzypek

Design: KAGERO STUDIO
Tomasz Gąska

OW KAGERO
ul. Mełgiewska 7-9
20-952 Lublin
tel./fax (+48-81) 749 11 81
tel./fax (+48-81) 759 65 03

e-mail: kagero@kagero.pl,
marketing@kagero.pl
www.kagero.pl

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POLIKARPOV Po-2

In the late twenties of the 20th century, Nikolai Polikarpov was tasked with designing a successor for the U-1 trainer. In 1928 M. Gromov test-flew the prototype designated "U-2". The new design was a success and soon afterwards the aircraft was mass-produced in the "Krasnyj Liotchik" works near Moscow. The new machine seemed to perfectly suit the Russian aviation industry capabilities of that time – it was simple, of wooden construction, and covered with fabric. The bi-plane arrangement ensured good handling in the air, while the rugged undercarriage was its great asset when operating from dirt airfields.

The five-cylinder M-11 engine rated at 73 kW/100HP (at a later date replaced by the M-11D, which produced 92 kW/125 hp) was reliable and had a decent fuel consumption. The aircraft was not a racer by any means, but that was irrelevant for the training purposes. It had a short take-off run and big wing area, the latter feature being invaluable for prolonged gliding. Many subvariants stemmed from the basic design: passenger, liaison, ambulance, psychological warfare, crop-dusting, experimental maritime, as well as the LNB (light night bomber). In 1944 the aircraft was re-designated as Po-2, its new designation followed by a single-letter suffix, which corresponded to a specific purpose of each of the aforementioned variants.

During the WWII the aircraft was extensively used for evacuating the wounded, dropping supplies, and as the commanders' personal means of transport. Many more performed the reconnaissance and artillery fire correction missions and, last but not the least, the night hit-and-run bomb raids Po-2 got famous for. The aircraft's ability to glide with its engine off enabled a stealthy approach and surprise attack. Its bomb load matched up to three-fourths of what the purpose-built assault Il-2 could carry along. The Germans christened Po-2 the "Night Witch", while the Russians called it "Kukuruznik" (corn cutter) or "Lesnik" (forester). The Poles who flew it usually referred to it as "Pociak" (a colloquial name derived from its official designation "Po-"). Despite high vulnerability to ground fire and a rather symbolic defensive armament, the aircraft remained in active service throughout the war. Paradoxically, its small speed was its best defence against air threats – it flew at the stall speed of the contemporary German fighters, which left an enemy pilot with very little time to line Po-2 up in his gunsight. The very same problem, only even more accentuated, was experienced by American fighters during the Korean War. Hardly detectable by radars due to its wood-and-fabric construction, it became a real nightmare for its opponents. Nevertheless, flying at the tree-top level to avoid attacks from beneath, Po-2s were extremely vulnerable to even small-arms fire.

The first Po-2 delivered to the Polish Army was a three-seater with hooded cockpit, presented to Col. Zygmunt Berling by Stalin in 1943. One year later, the Polish Air Force units activated in USSR received the following variants of Po-2:

Po-2 WS (liaison) – operated by the 17th Autonomous Liaison Command.

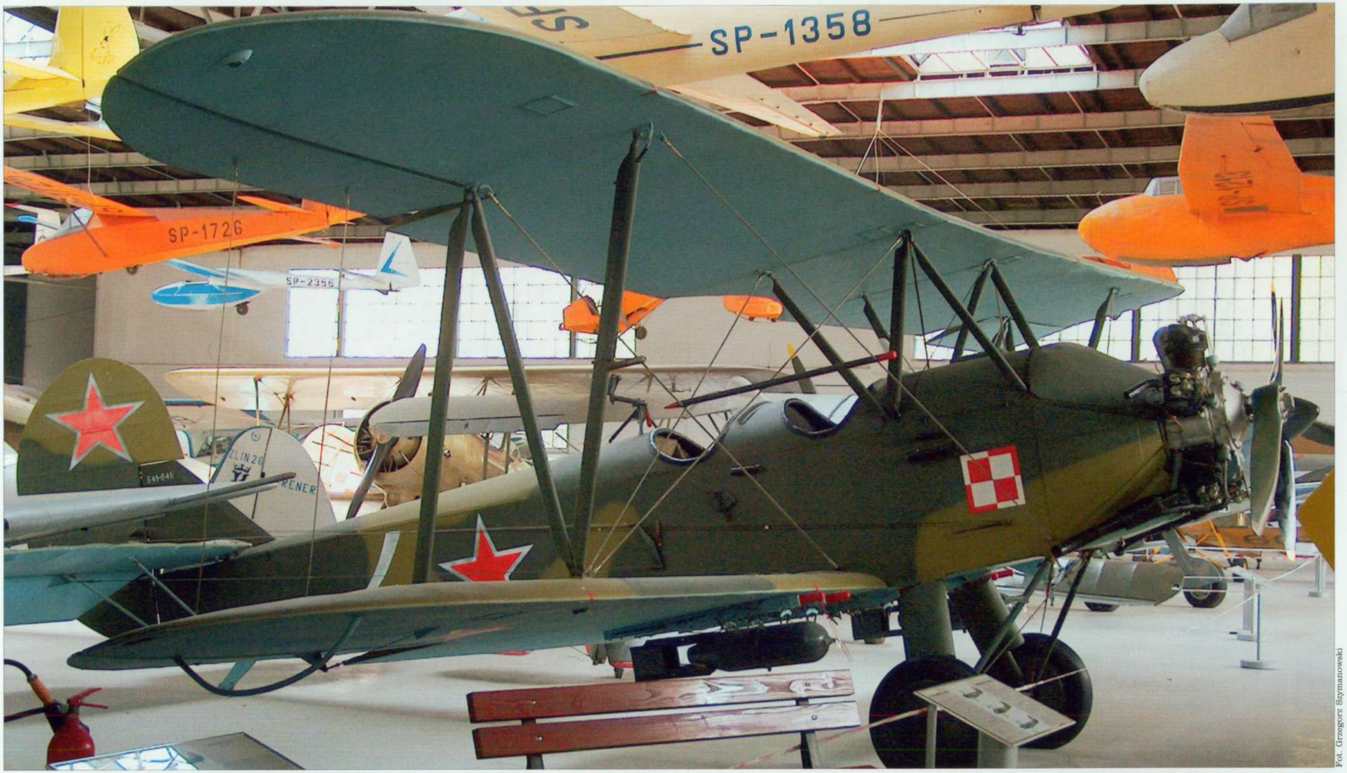
Po-2 LNB (light night bomber) – by the 2nd Night Bomber Group "Kraków" (Cracow).

Po-2 S (ambulance) – by various units.

Po-2 PS and SP (passenger) – by various units.

After the war, the aircraft was manufactured under licence (only with some minor modifications) as CSS-13. Its production run reached nearly 550 aircraft. Those were still in use by some flying schools as late as the seventies. A few Po-2s are private-owned and remain airworthy until present day.

Grzegorz Szymanowski



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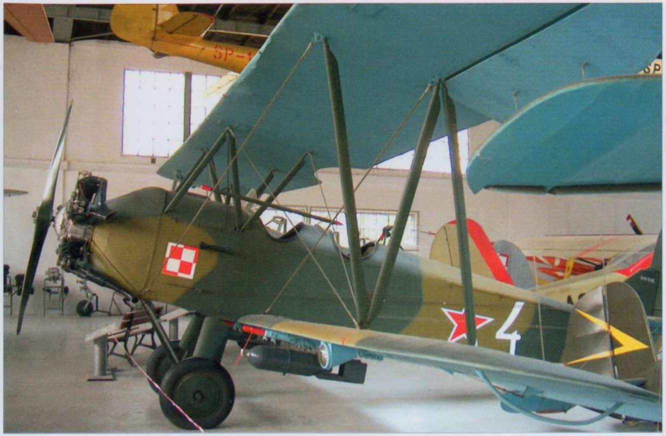
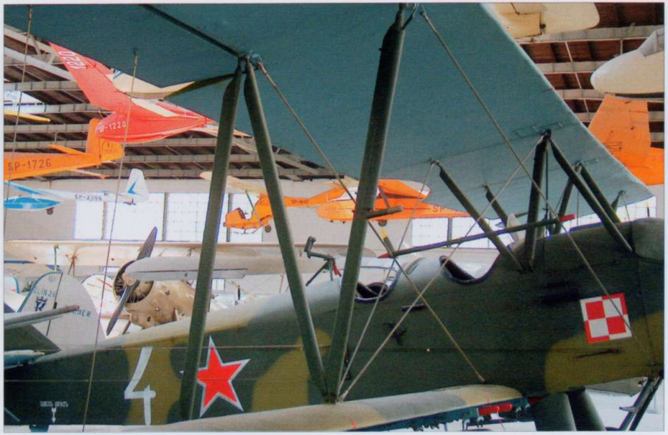
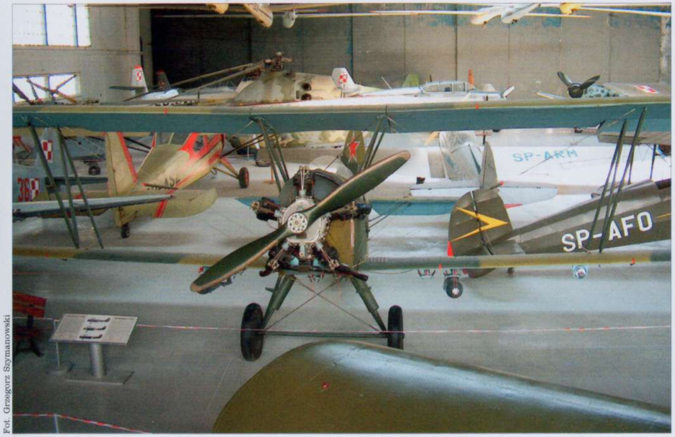
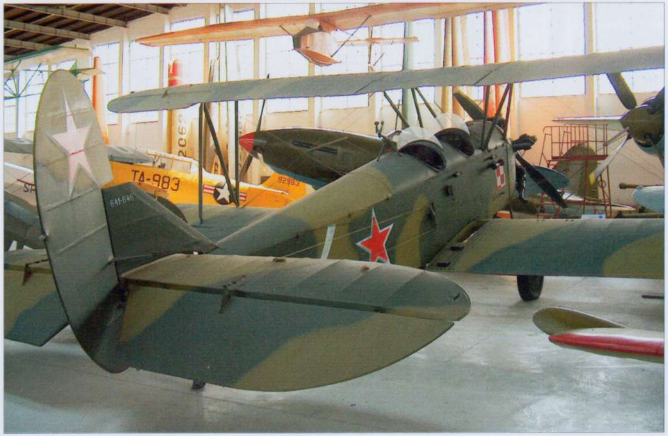
The aircraft presented in these photographs is Po-2 LNB s/n 641-646. It was assigned to the 2nd „City of Krakow" Night Bomber Group at the end of WWII. Thereafter, it served with the 4th Aviation Group (Assault). It was relieved from combat duty in 1949 and transferred to the civil aviation. Afterwards, it was put on display in the Communication Museum, and in 1963 it was eventually taken over by the Polish Aviation Museum. Carefully restored, it's by now a real treasure – the only preserved bomber version of Po-2 in the world • Prezentowany na zdjęciach egzemplarz Po-2 LNB o numerze fabrycznym 641-646 służył w 2 Pułku Nocnych Bombowców „Kraków", w składzie którego latał pod koniec wojny, potem trafił do 4 Szturmowego Pułku Lotniczego. Karierę wojskową zakończył w 1949 roku, potem latał w lotnictwie cywilnym. Z czasem stał się eksponatem Muzeum Komunikacji, a od 1963 roku Muzeum Lotnictwa. Pieczołowicie odrestaurowany jest unikatem – jedynym Po-2 w wersji bombowej na świecie









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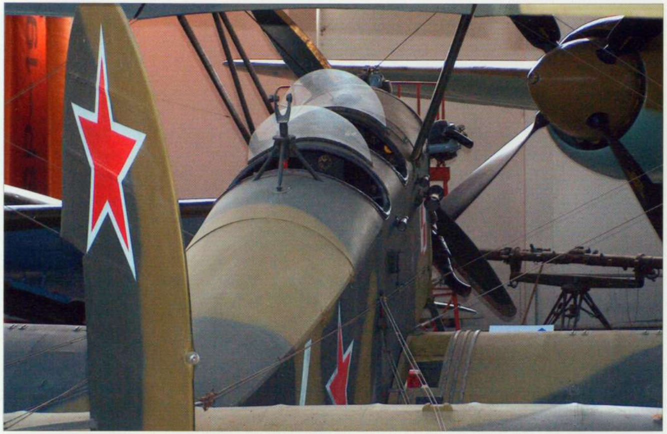
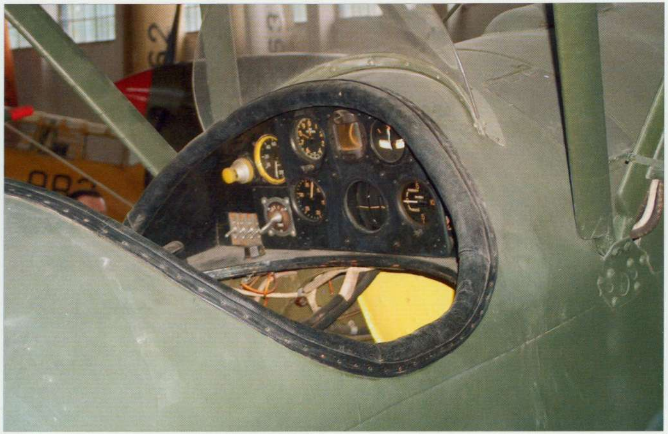
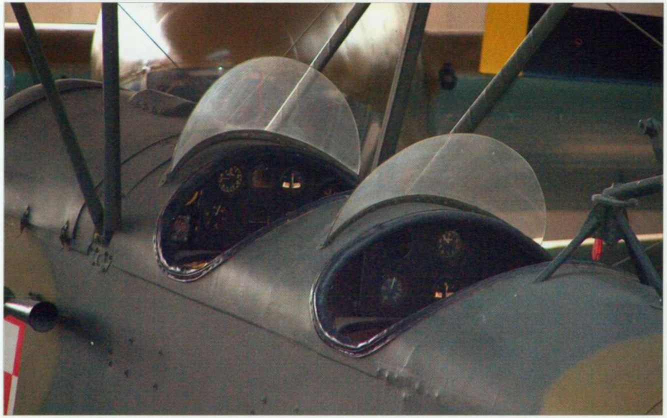
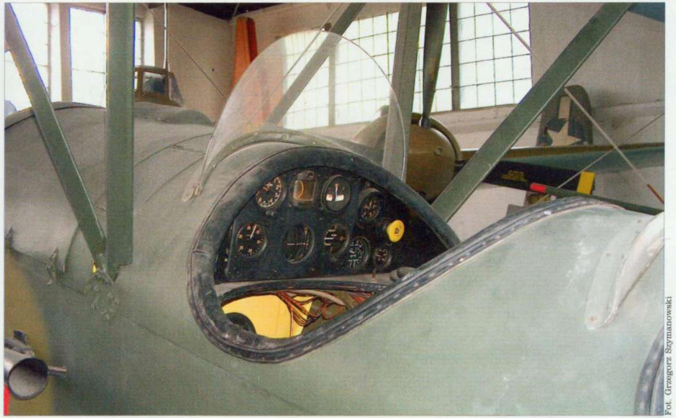






Both cockpits, note the instrument panels and windshields • Kabiny



Front (pilot's) cockpit • Kabina pilota

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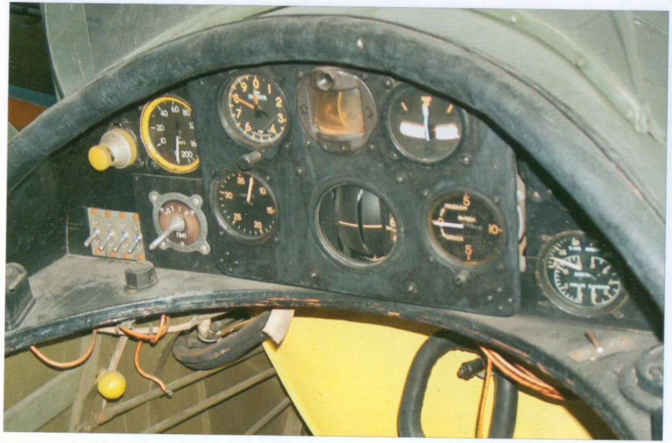
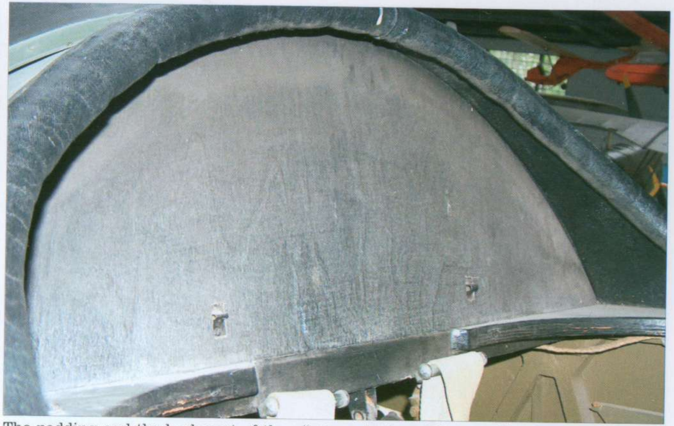
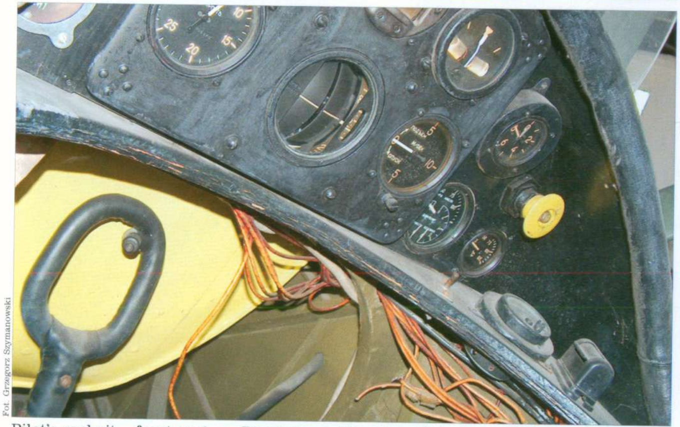




The padding and the back part of the pilots cockpit • Tylna część kabiny pilota



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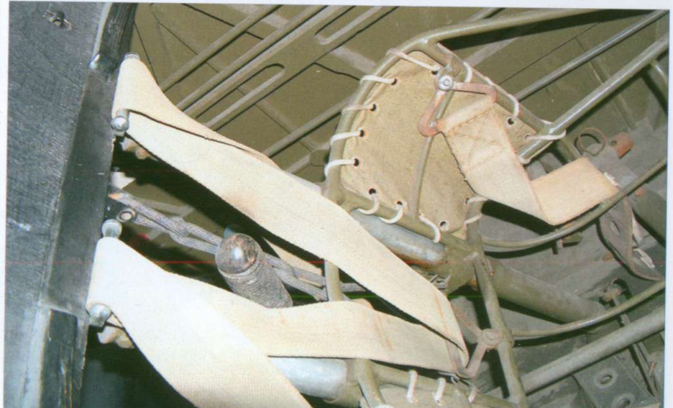
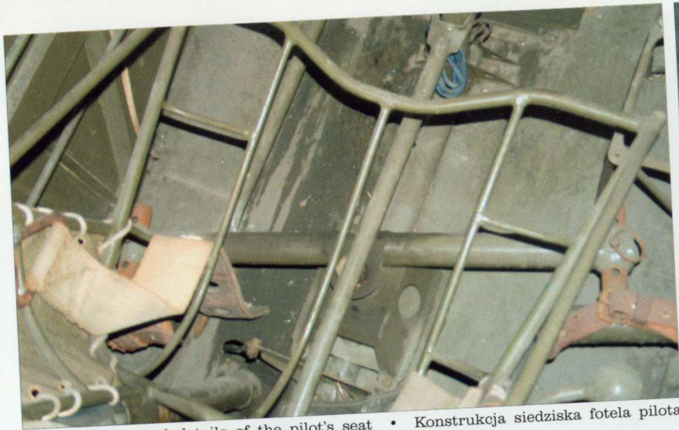
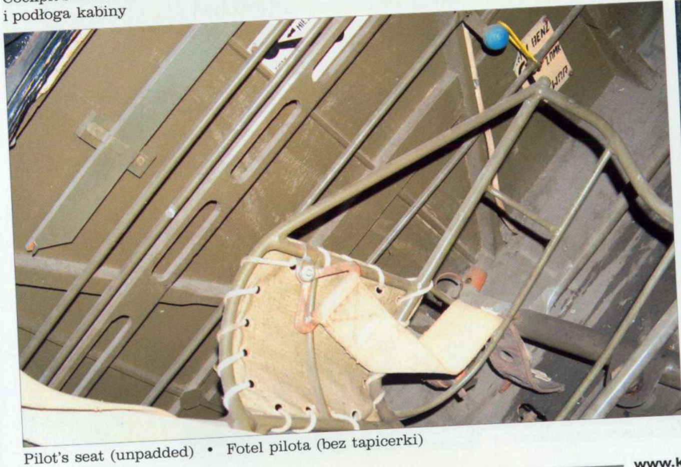
Pilot's cockpit – front part • Przednia część kabiny pilota



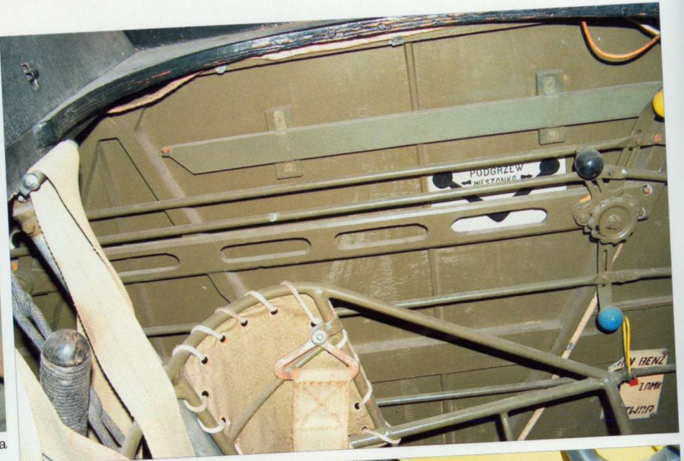
Pilot's seat (unpadded) • Fotel pilota (bez tapicerki)

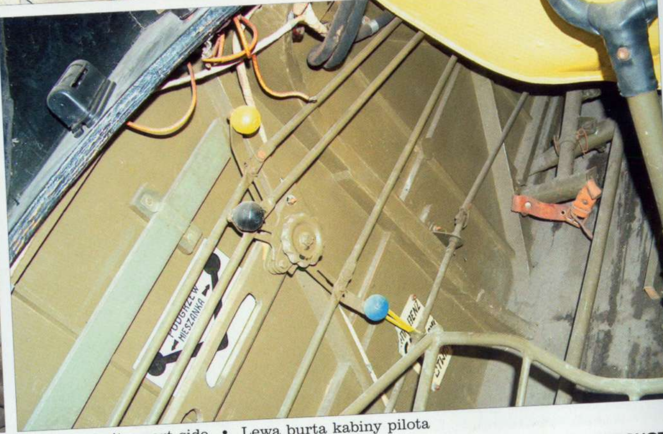


Cockpit's floor and details of the pilot's seat • Konstrukcja siedziska fotela pilota i podłoga kabiny



Pilot's seat (unpadded) • Fotel pilota (bez tapicerki)





Pilot's cockpit – port side • Lewa burta kabiny pilota

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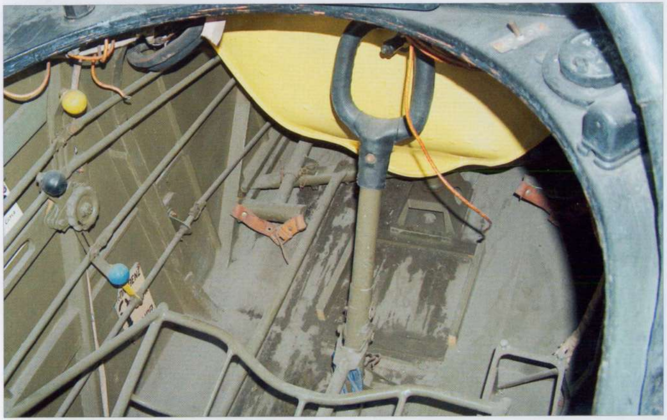
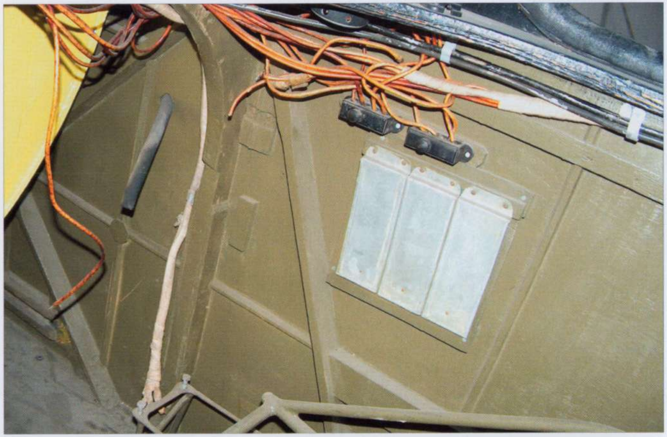
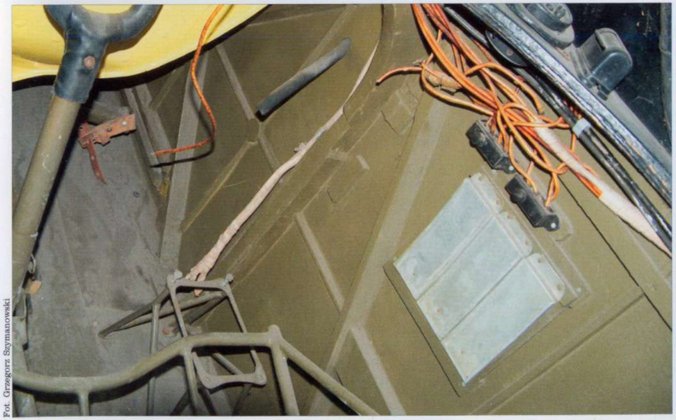
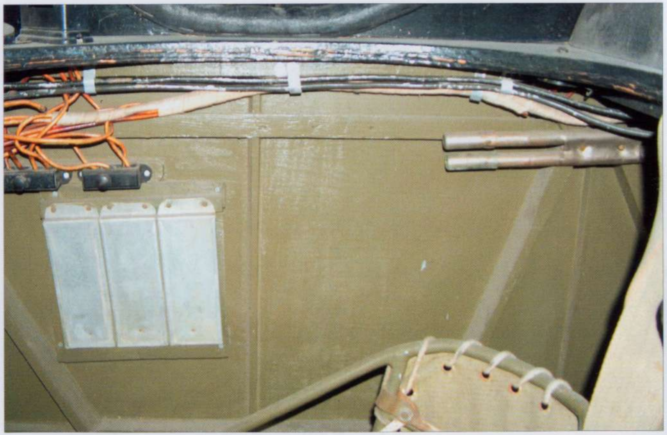


Pilot's cockpit – Steering column and the floor • Drążek sterowy





Pilot's cockpit – starboard side • Prawa burta kabiny pilota



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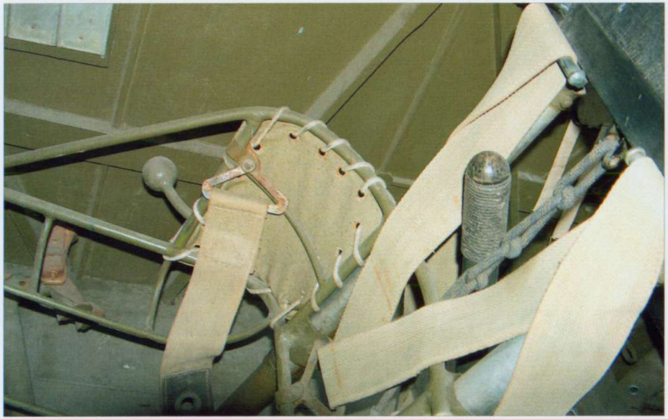
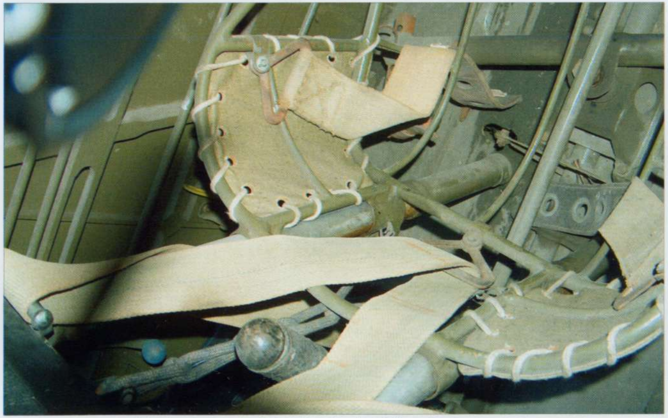
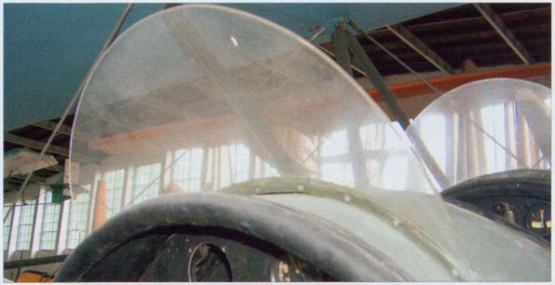


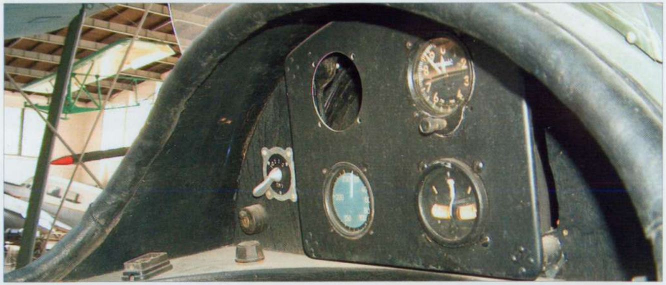
Pilot's cockpit – starboard side • Prawa burta kabiny pilota

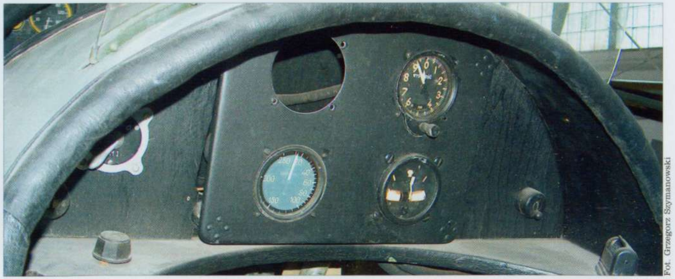


Pilot's seat (unpadded) • Fotel pilota (bez tapicerki)



The rear cockpit windshield • Wiatrochron tylnej kabiny





Rear cockpit – the instrument panel • Tablica przyrządów tylnej kabiny

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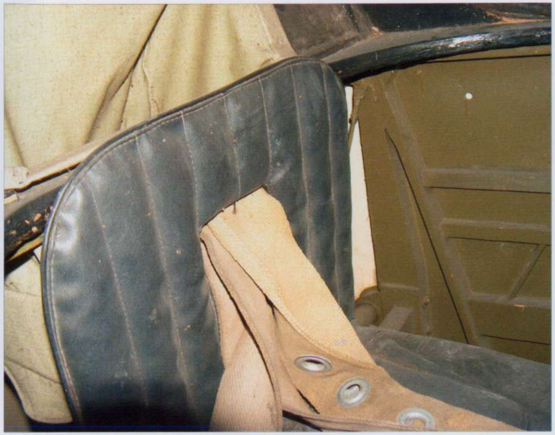
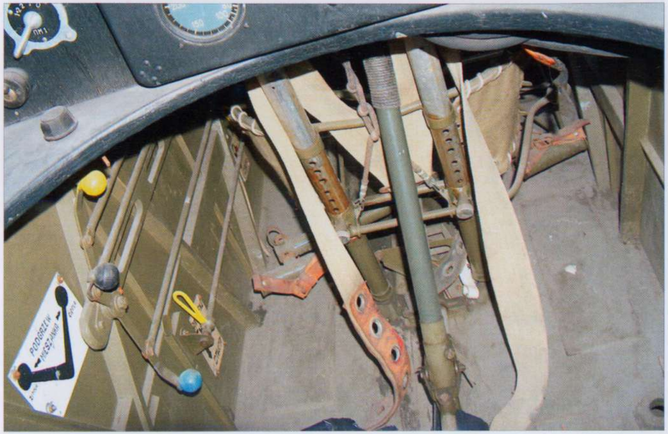
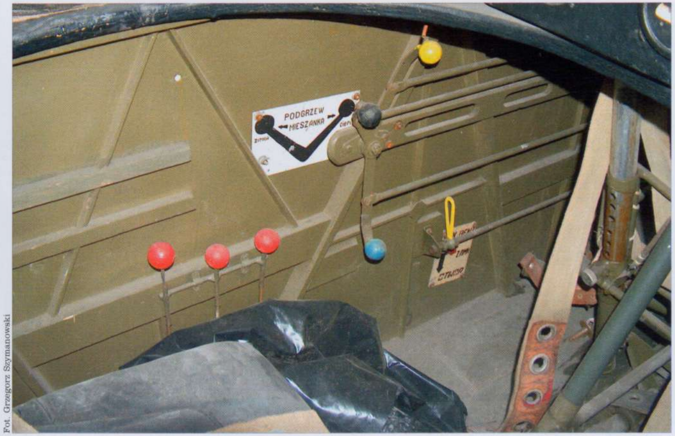
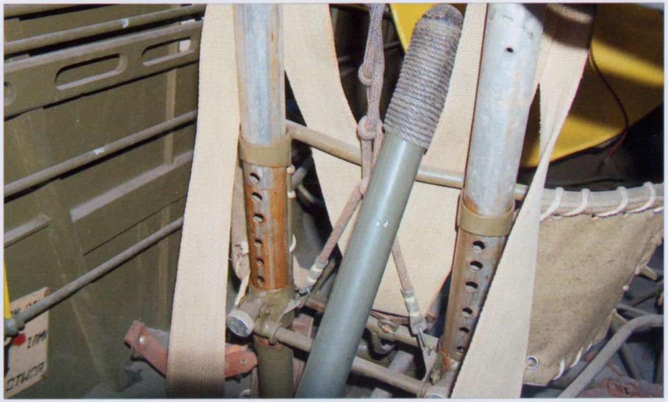


Only the rear seat preserved its padding. It was fixed and as such, substantially hampered the gunner's movements while firing his machine gun • Tapicerka na tylnym fotelu







◄▲ Rear cockpit's left board and second (reserve) steering column • Lewa burta tylnej kabiny i drugi drążek sterowy

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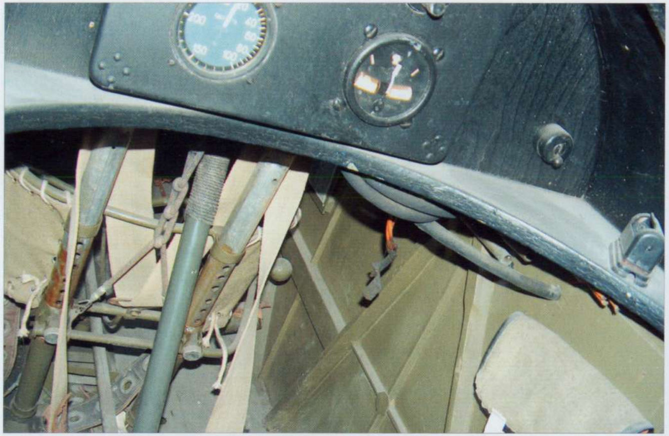
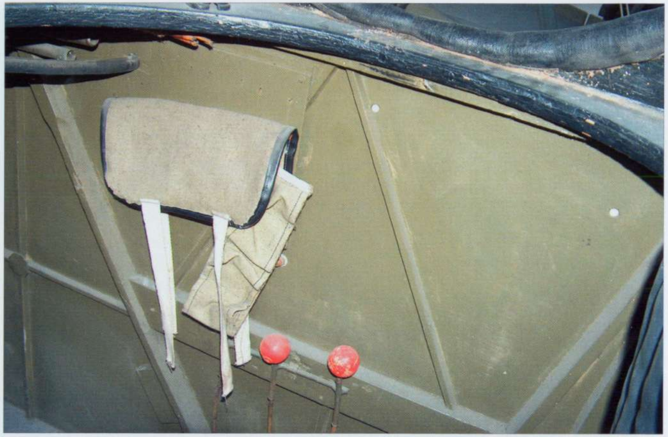
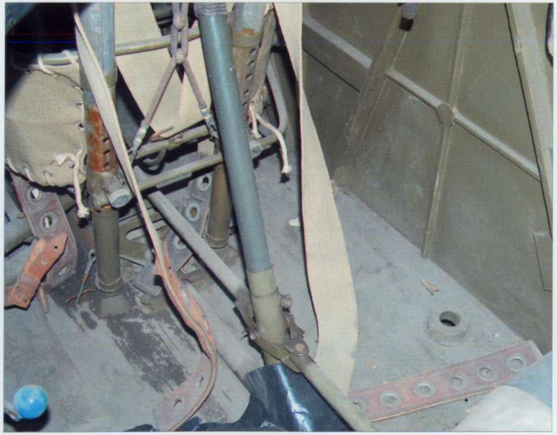
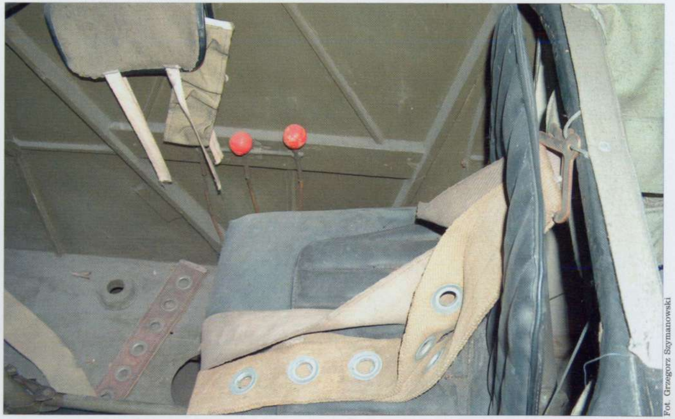




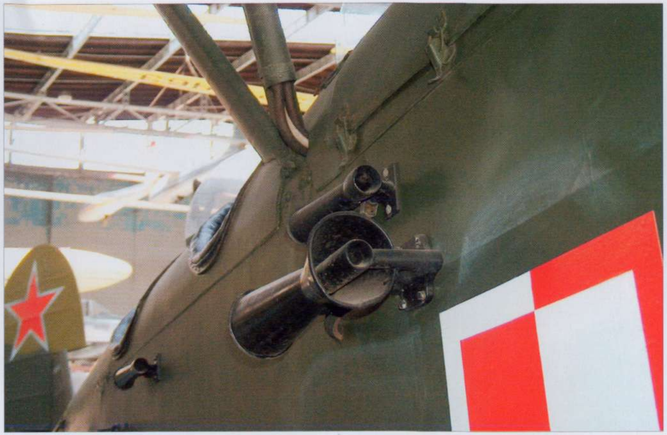


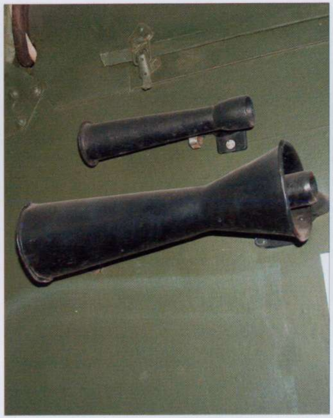
A steering column in the rear cockpit, often dismantled from bombing missions • Drążek sterowy w tylnej kabinie

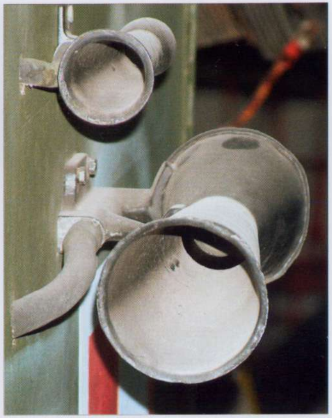


Rear cockpit's starboard • Prawa burta tylnej kabiny

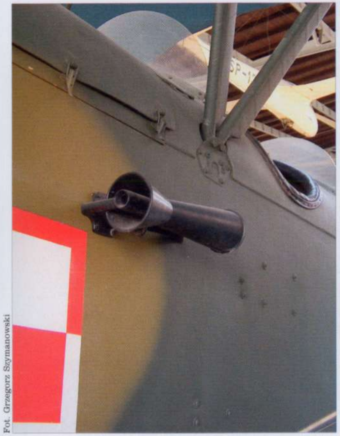
Fot. Grzegorz Szymanowski

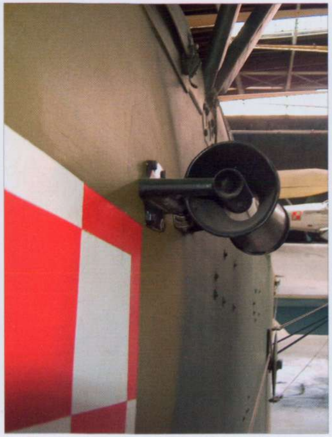






◄ ▲ Venturi tubes on both boards • Dysze Venturi'ego po obydwu stronach samolotu





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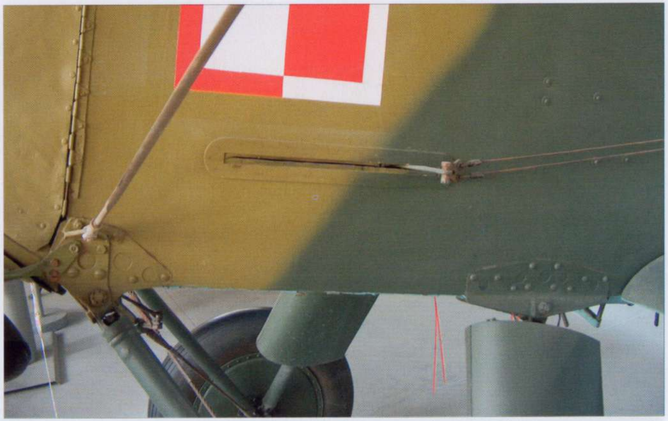
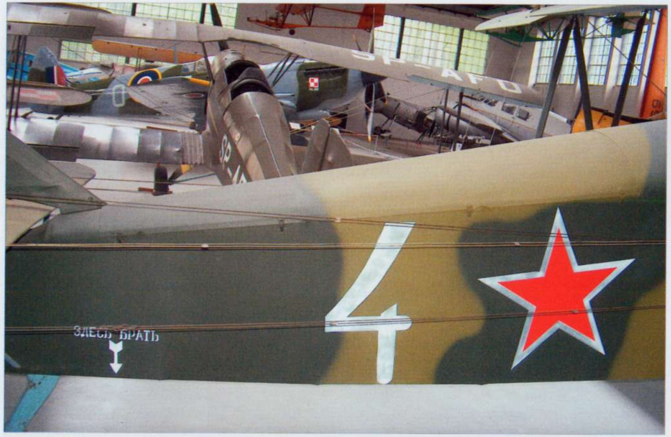
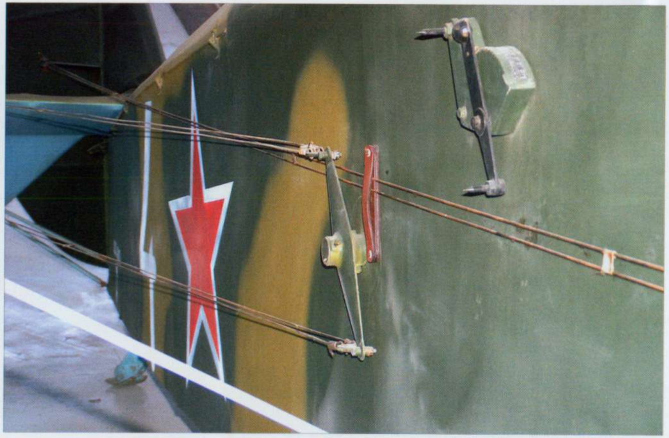
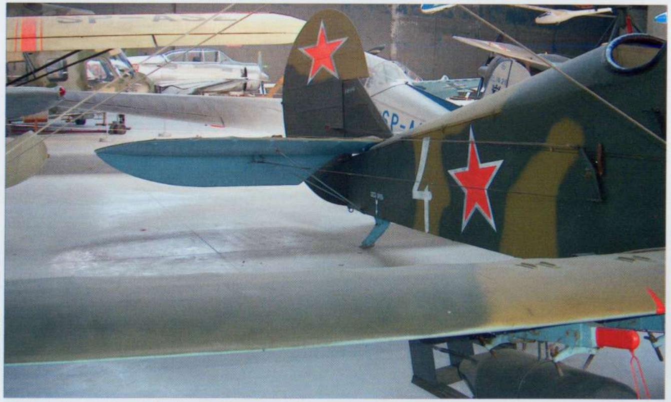


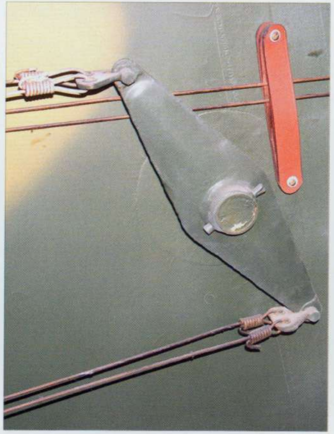
The undercarriage attachment joints • Węzły mocowania podwozia

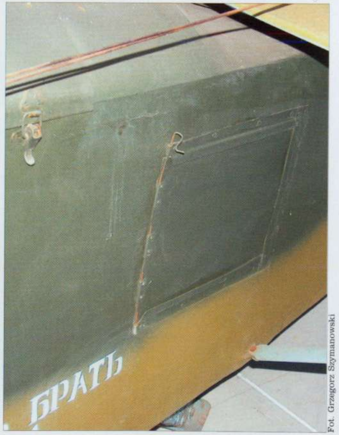






Elevator's and rudder's double steering wires • Zdwojone linki sterów wysokości i kierunku





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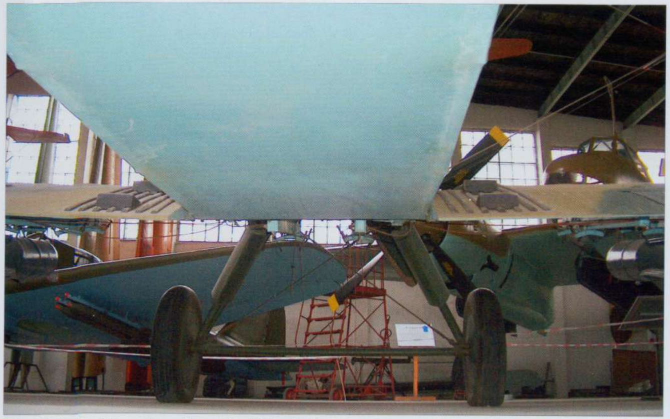
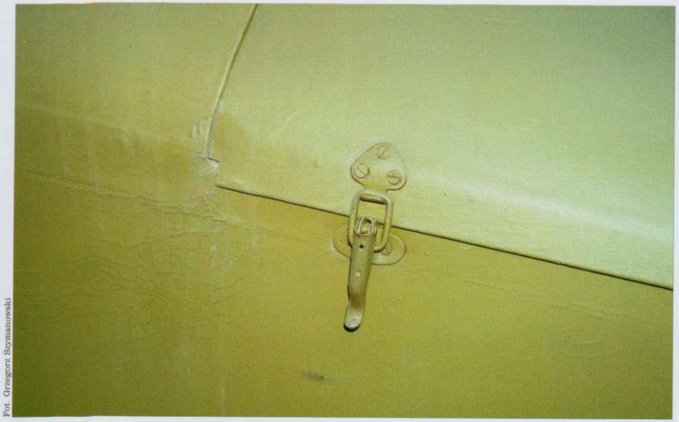
Elevator wires at the tailplane



The "belly" of the aircraft • Spód kadłuba



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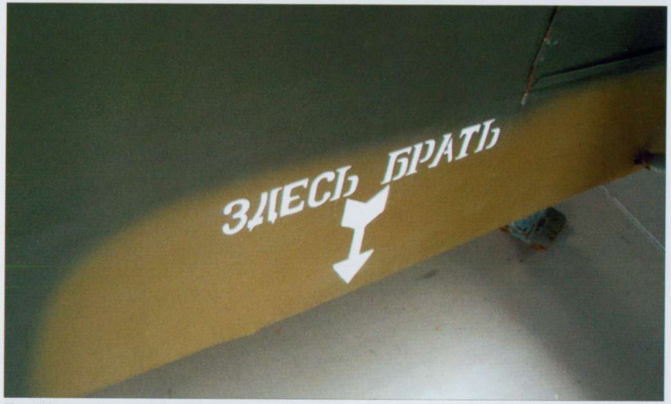
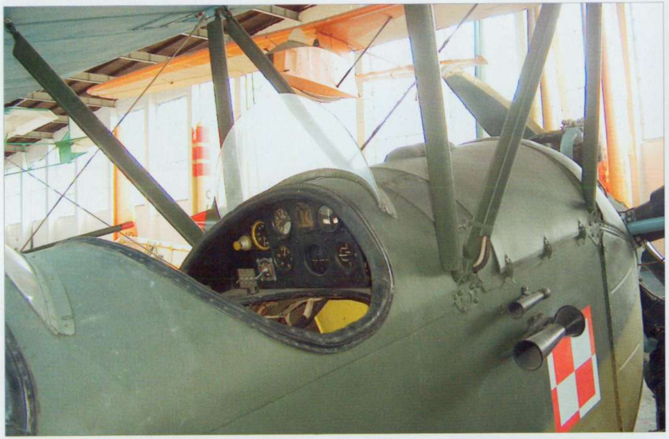
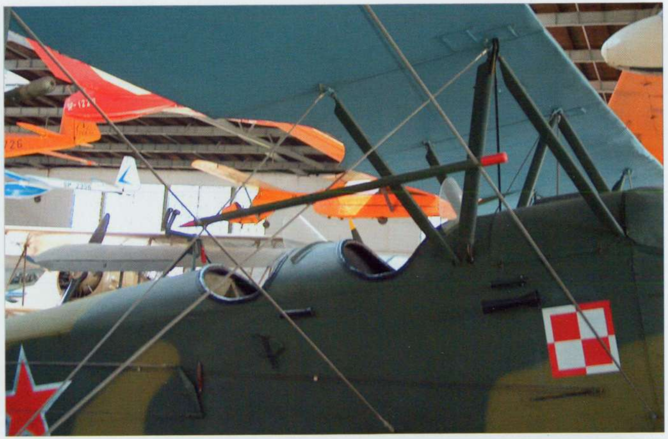
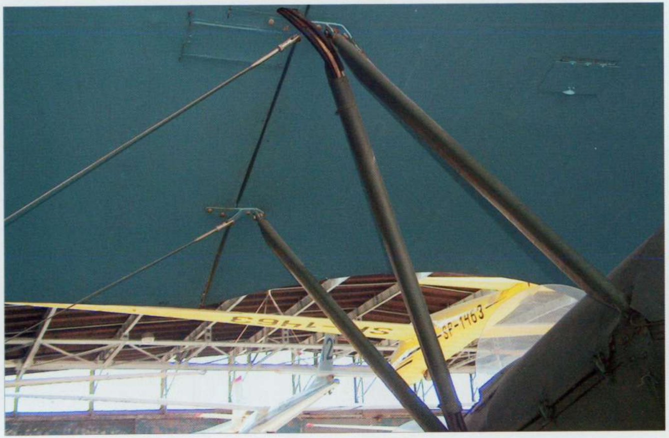
Fuselage top's zip • Zapięcie górnej części kadłuba

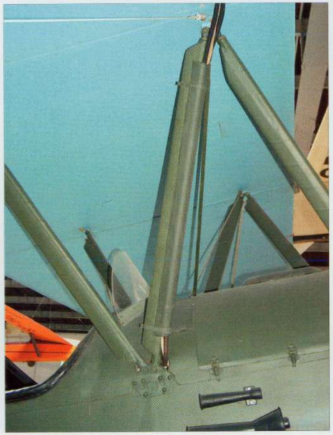


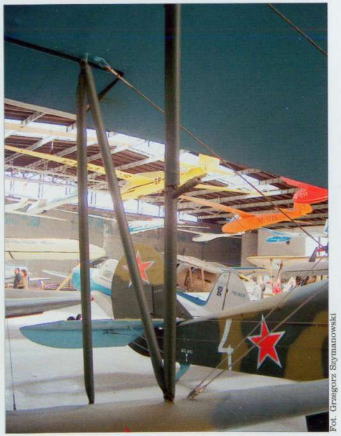
For lift rear part of fuselage and his Russian marking • Uchwyt do unoszenia tylnej części kadłuba i jego oznakowanie











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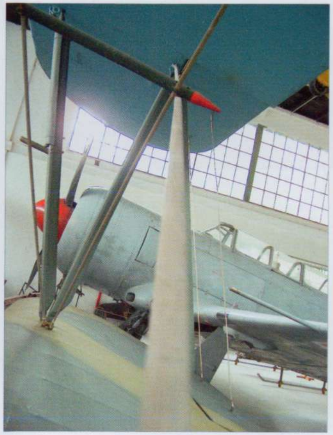
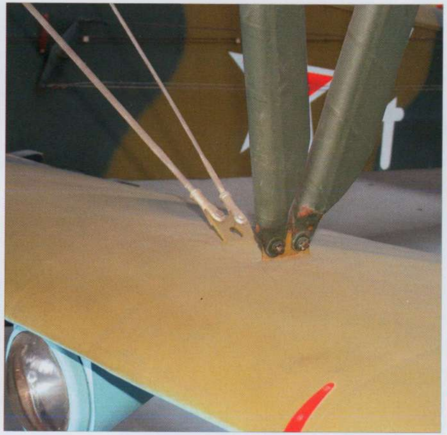
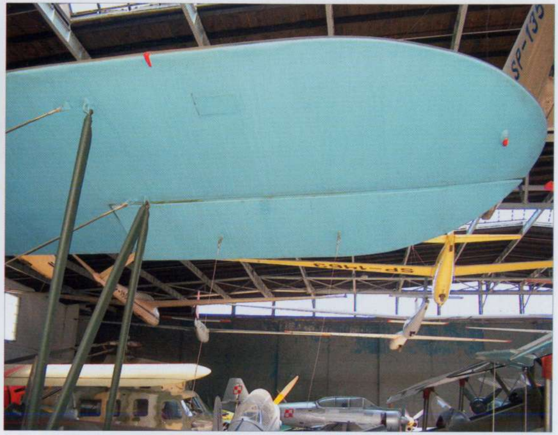
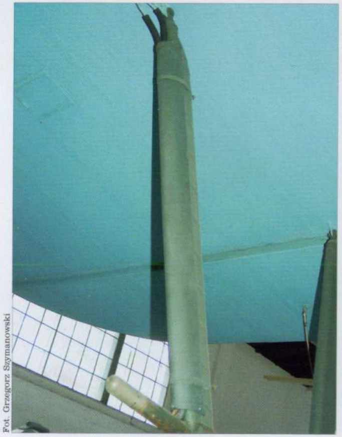
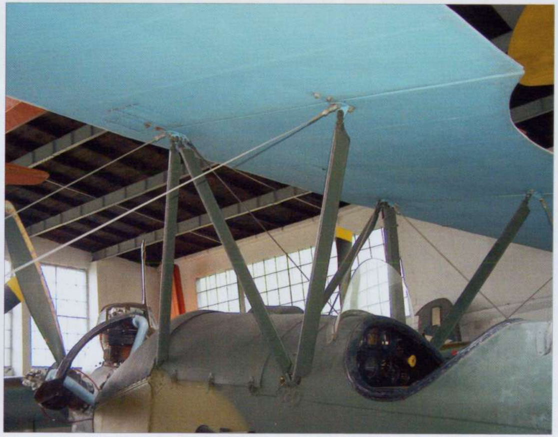
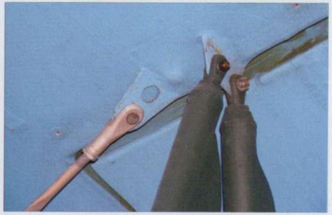


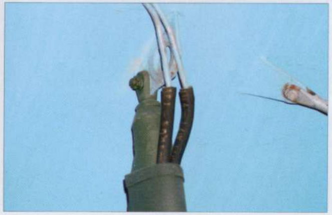






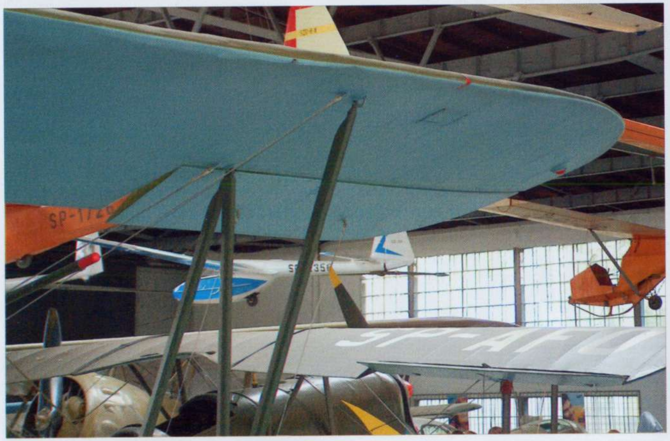


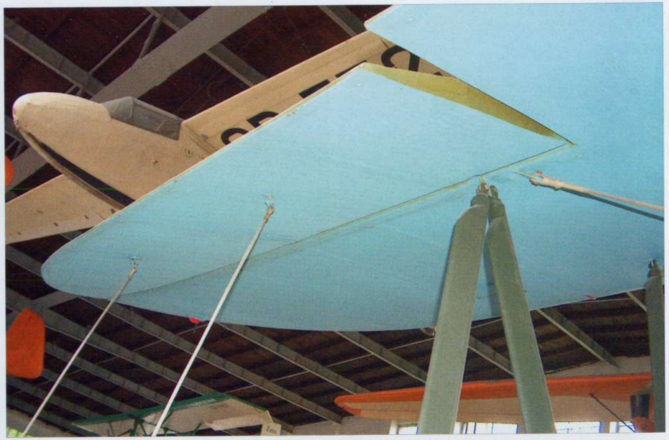


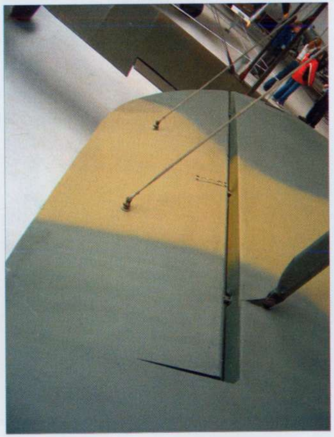


Wings cellule. Note cables from Pitot's tube on right strutts • Komora płatów

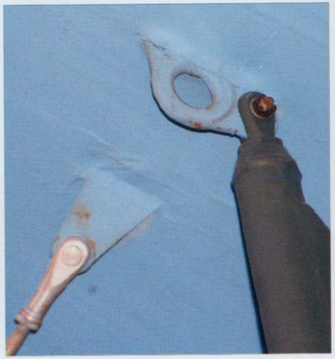
Fot. Grzegorz Szymanowski

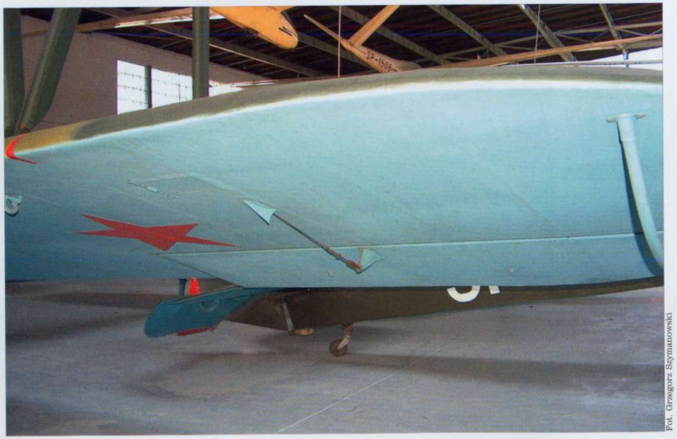






Ailerons and struts. The construction of ailerons helps to tell apart an original Po-2 from the lincence-built CSS-13 • Lotki i szczegóły mocowania rozpórek.





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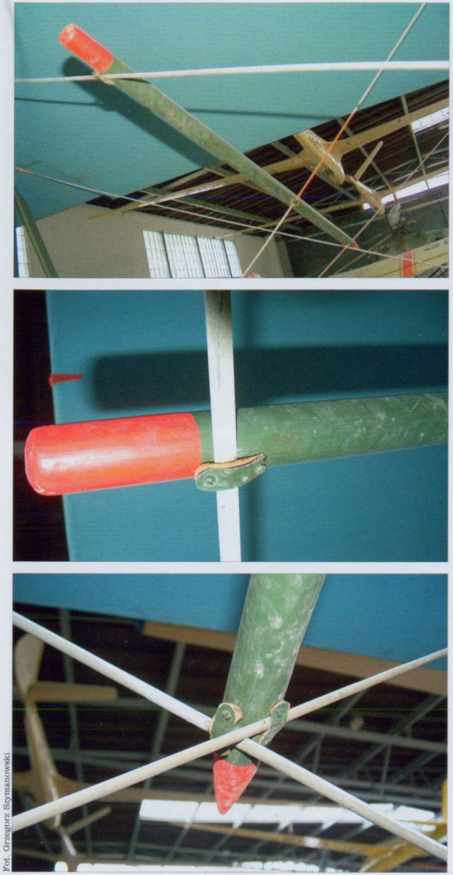
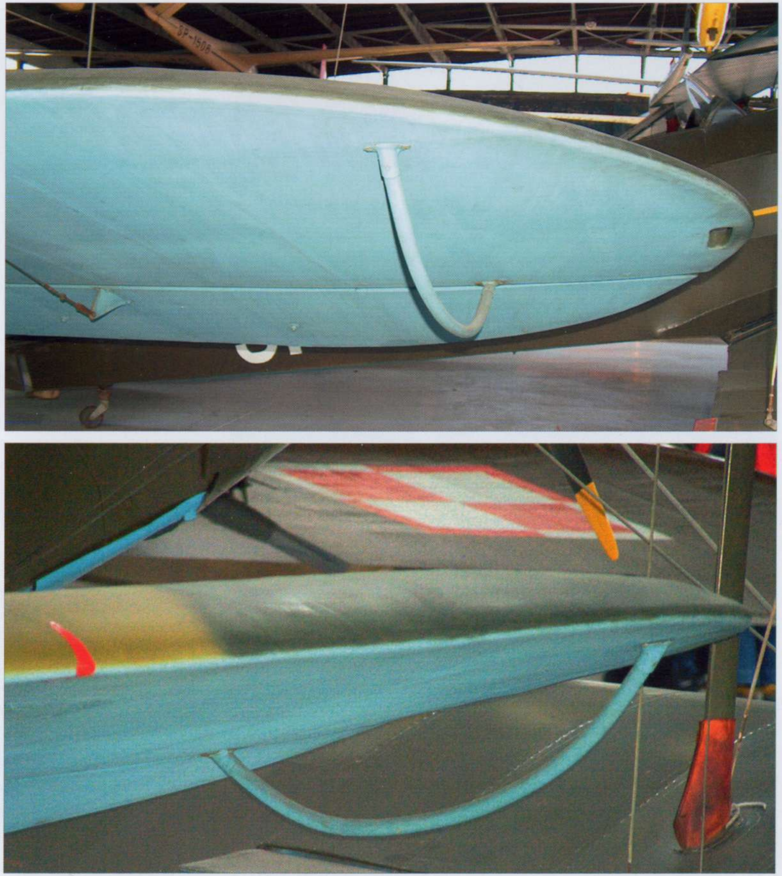
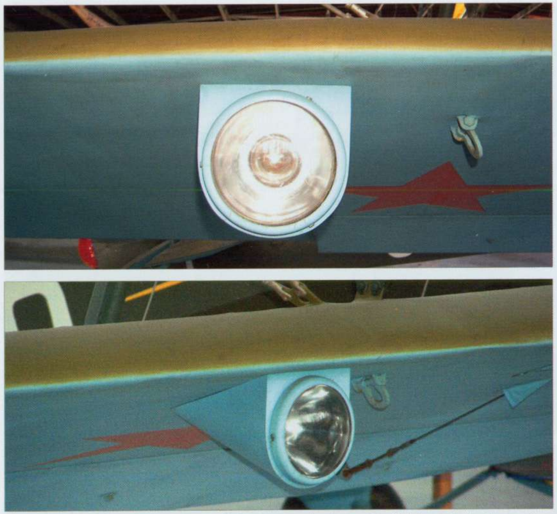


◀ Details of the wooden spacer bar • Naciąg komory płatów

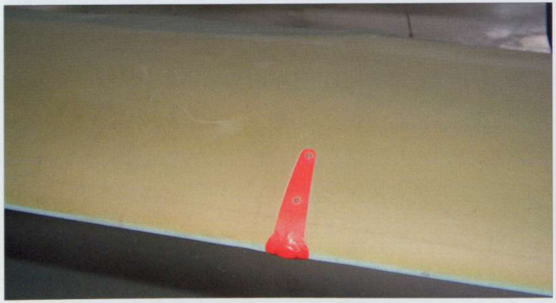
Fot. Grzegorz Szymanowski



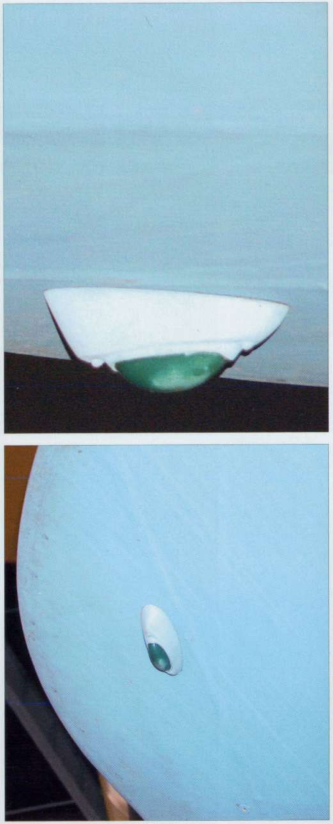
▶ The bows mounted underneath the lower wings secured them from damage at landings. Note the mechanism actuating the aileron of the lower wing, as well as an opening in the wing, designed as a grip when manually moving the machine around on the ground. Together with a lug under the wing, it was used for anchoring the machine on the airfield • Pałąki zabezpieczające pod skrzydłami



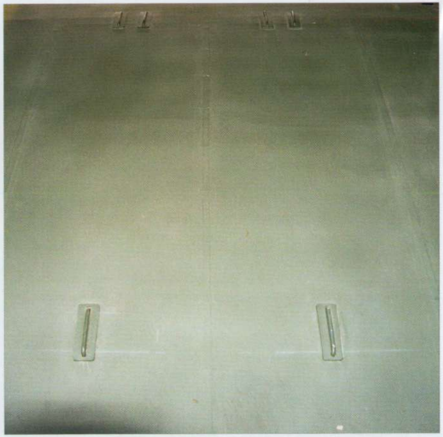
Landing light (only under left bottom wing) • Reflektor do lądowania



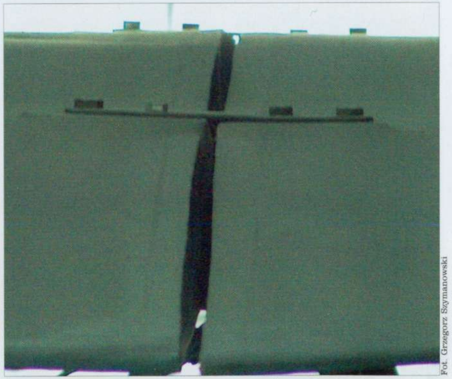
Straking securing leading edge • Nakładka zabezpieczająca krawędź natarcia



Position light (green on both sides of right upper wing, red on both sides of left upper wing) • Światło pozycyjne

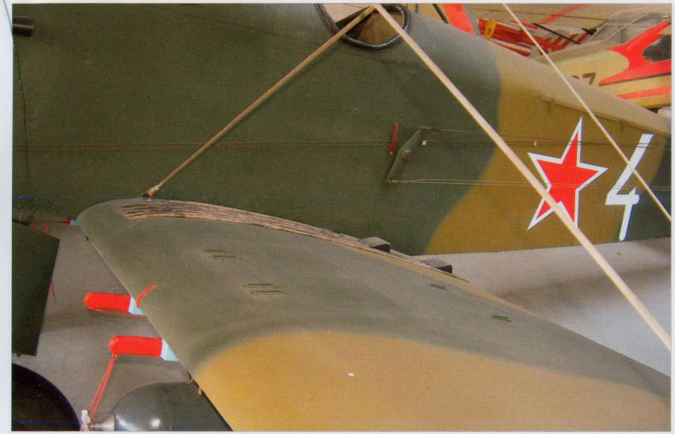


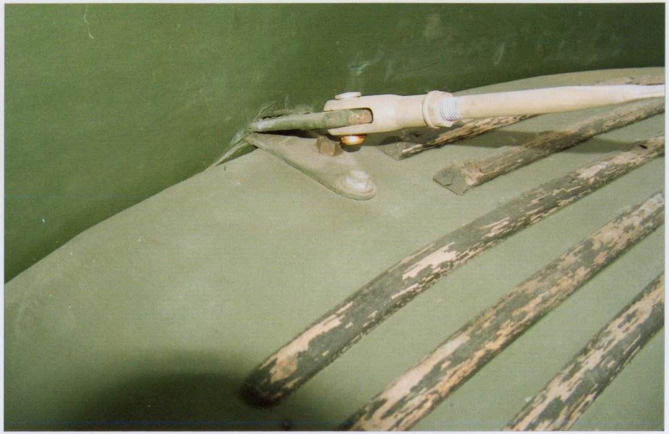
Top of wing with reinforcements over the bomb racks • Górna część skrzydła ze wzmocnieniami

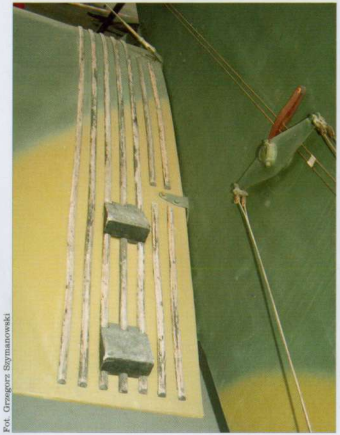


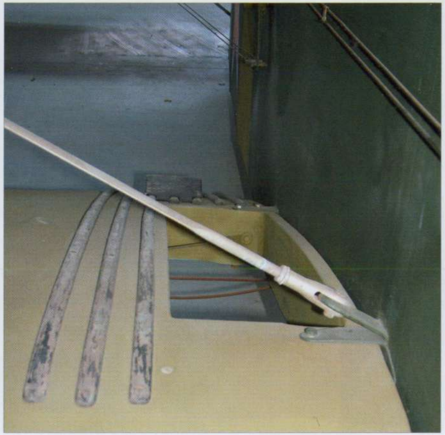
Upper wing socket • Połączenie górnych płatów

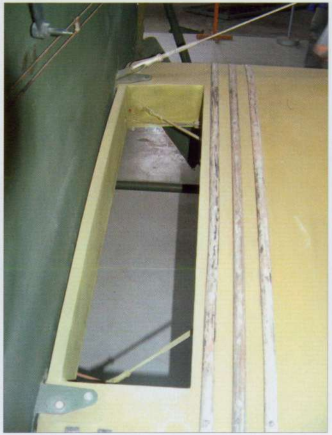
Fot. Grzegorz Szymanowski





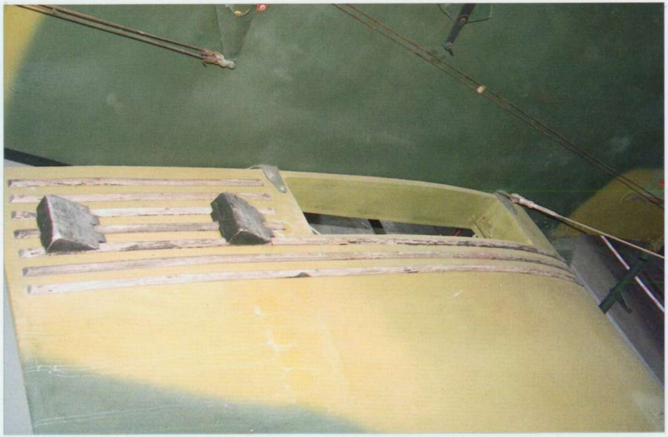


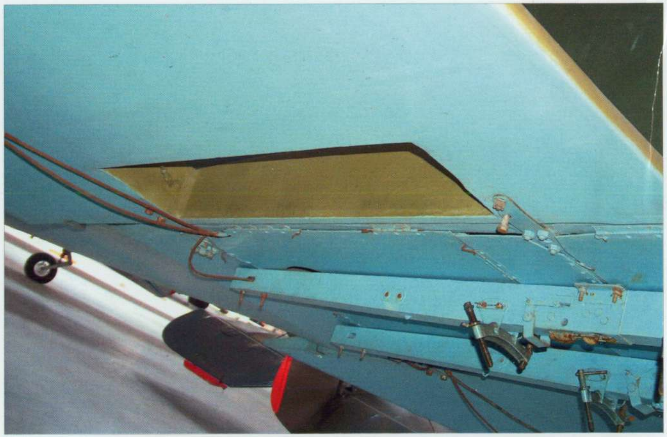


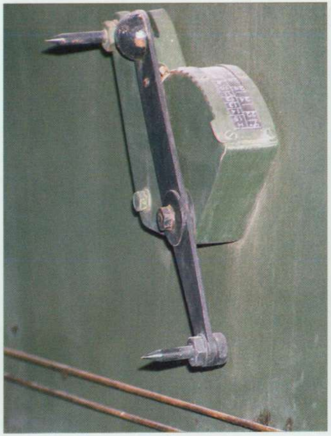


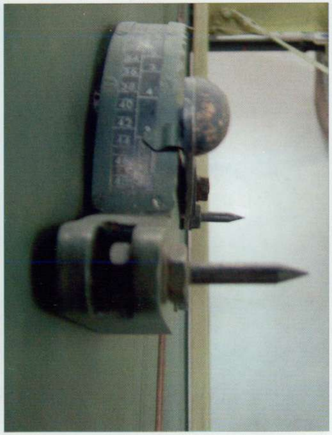
Walkways on wings and cutted area for bomb sight (only in right wing) • Chodniki na skrzydłach i wycięcie dla celownika bombowego

Fot. Grzegorz Szymanowski

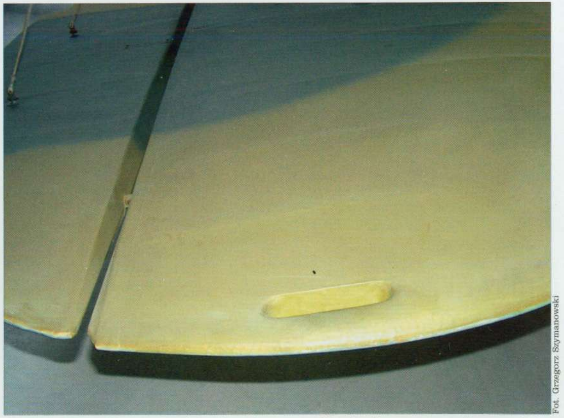








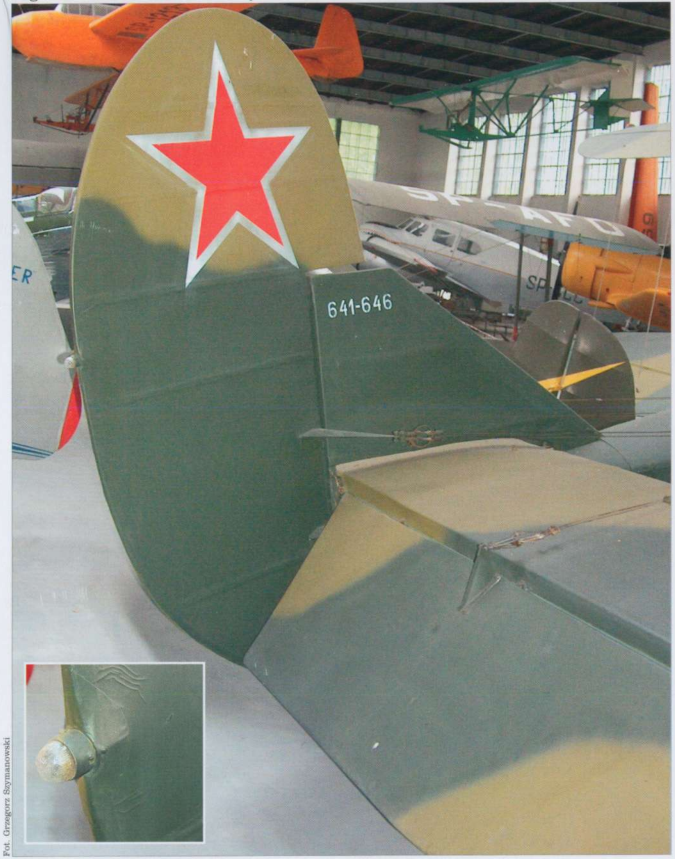
▲
◄
Simply bomb sight on starboard and cutted area in right wing (need to use the bombsight) • Prosty celownik bombowy na prawej burcie i wycięcie w prawym płacie umożliwiające celowanie

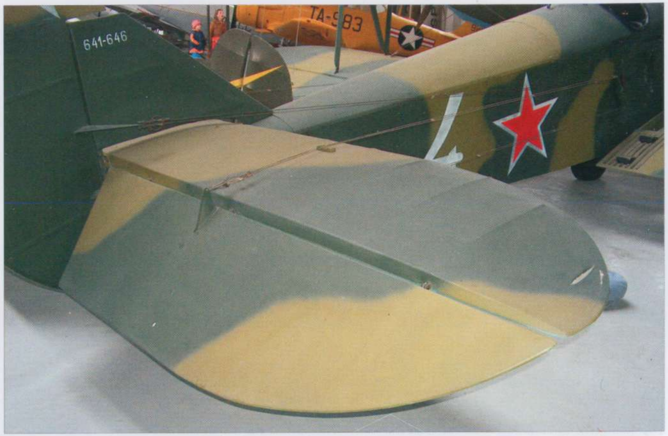


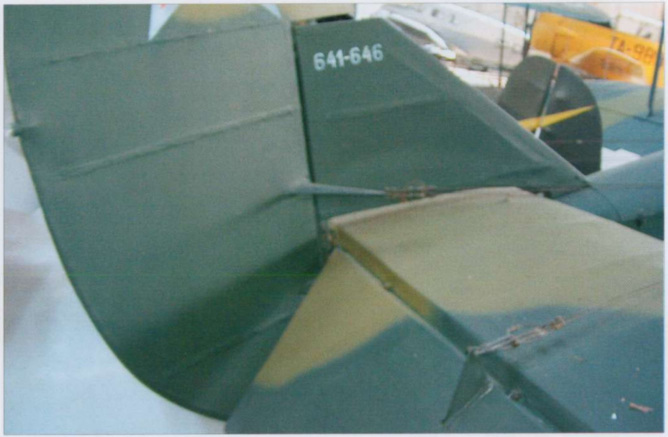
Fot. Grzegorz Szymanowski

Hole in wing for anchoring the plane • Otwór do cumowania samolotu

Pages 23-26: Tail unit • Strony 23-26: Usterzenie samolotu







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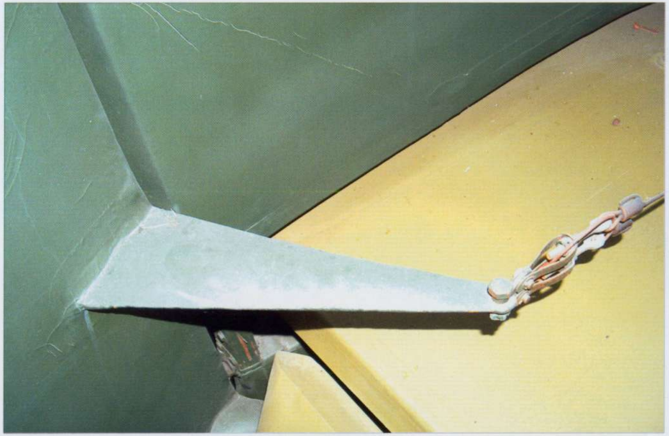

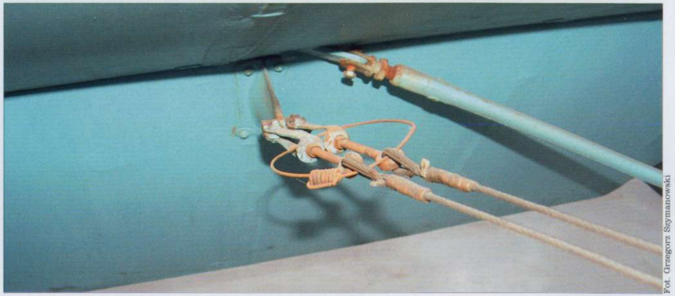

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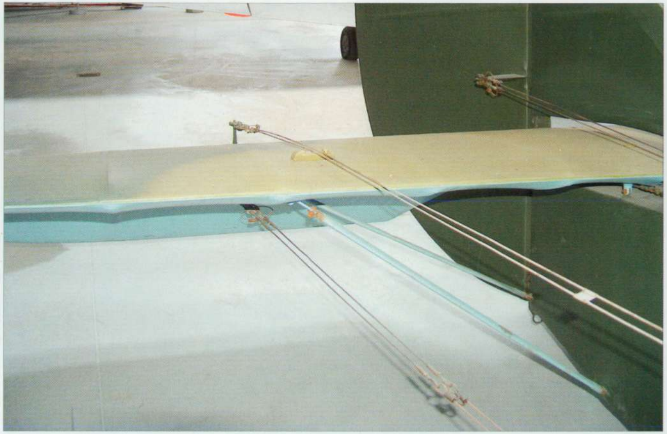
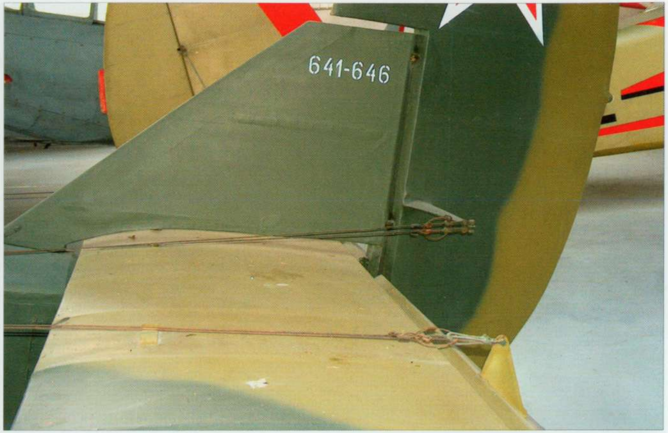
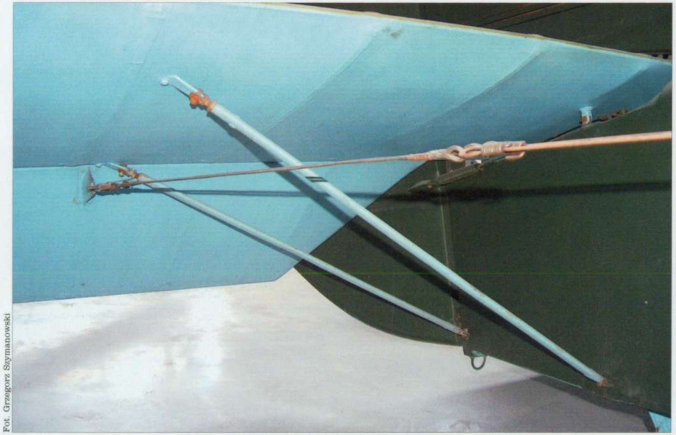
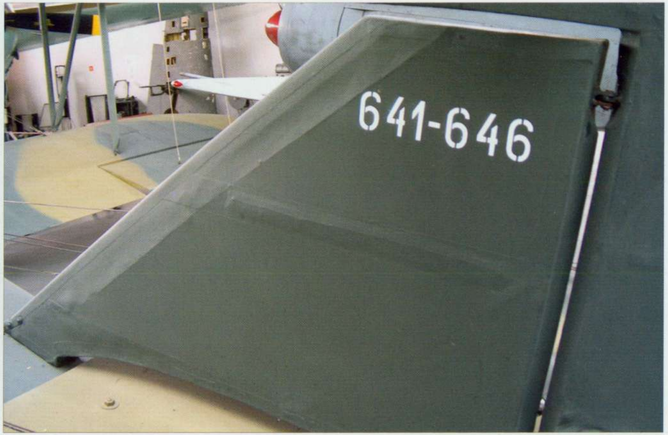
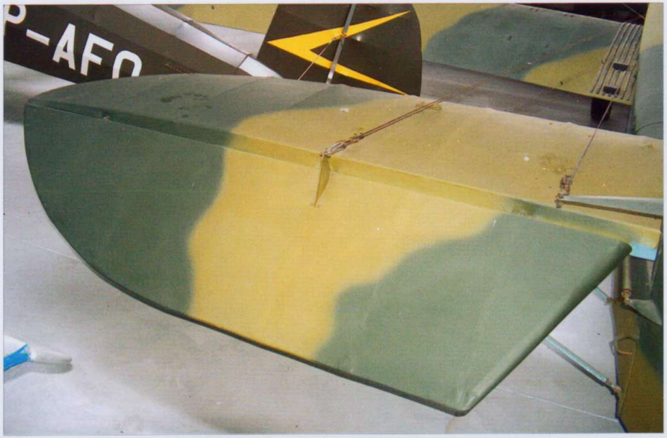


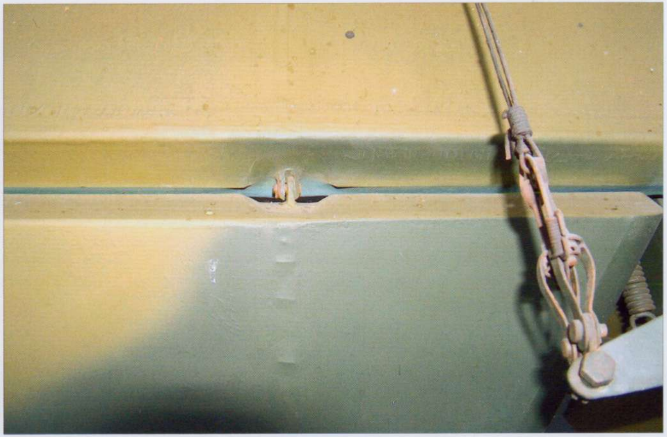


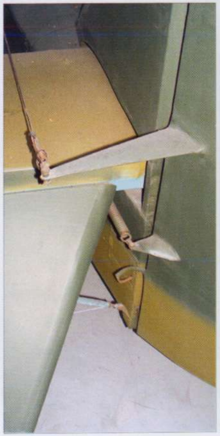


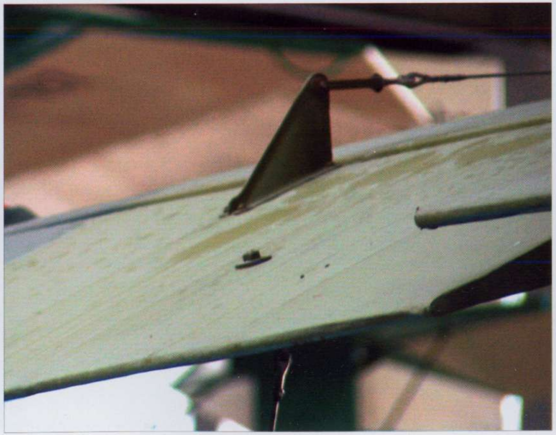


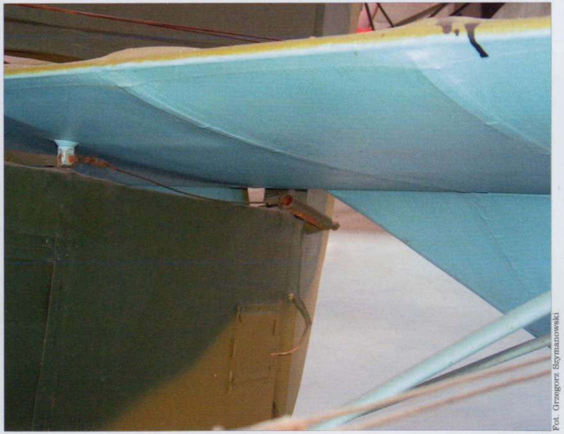
Fot. Grzegorz Szymanowski











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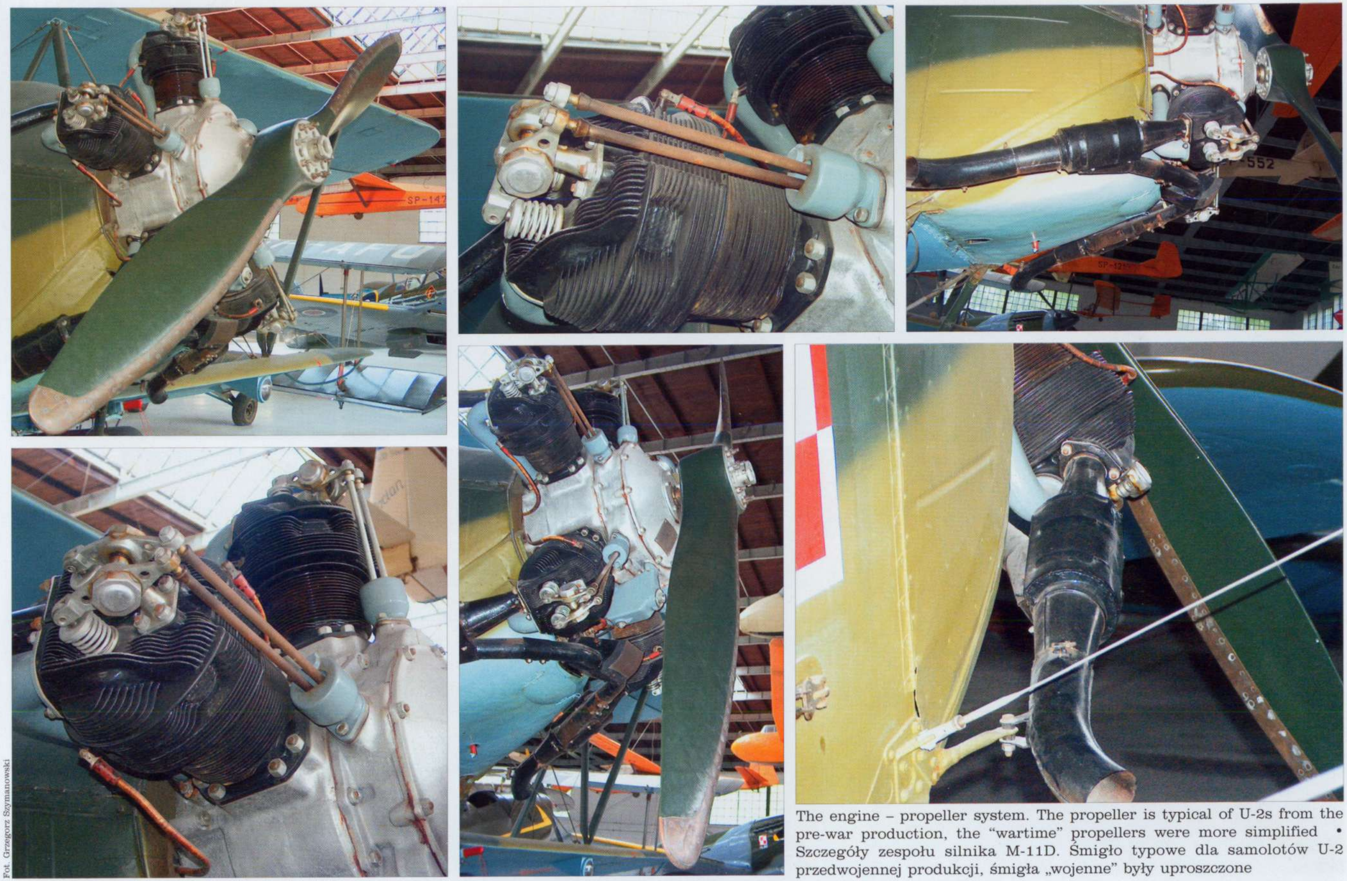
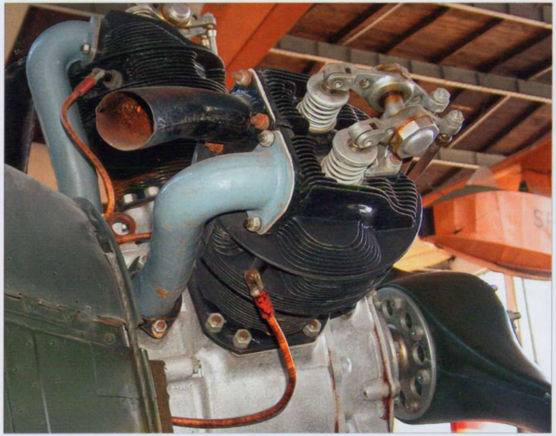
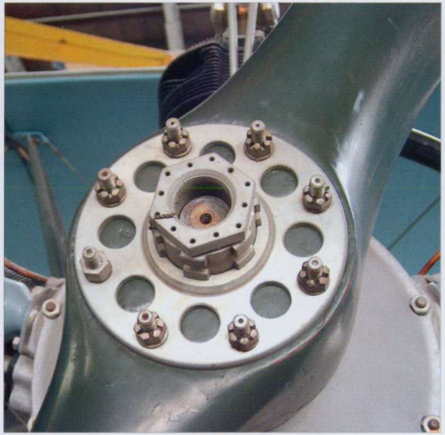
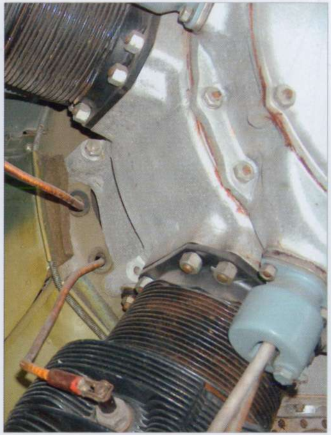


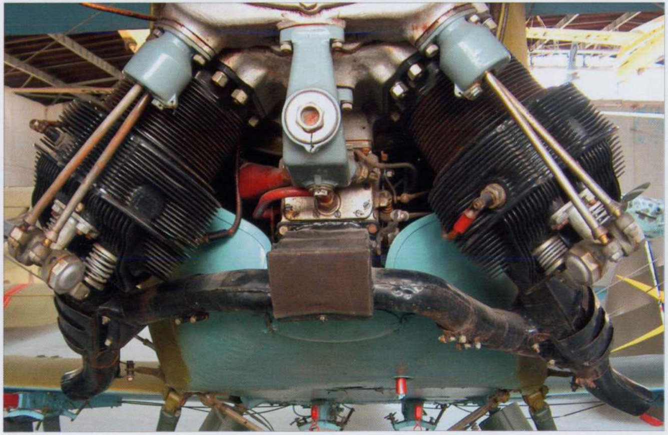
The engine – propeller system. The propeller is typical of U-2s from the pre-war production, the "wartime" propellers were more simplified • Szczegóły zespołu silnika M-11D. Śmigło typowe dla samolotów U-2 przedwojennej produkcji, śmigła „wojenne" były uproszczone

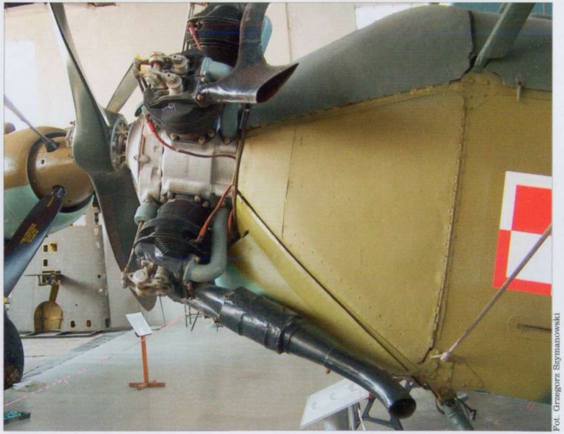
Fot. Grzegorz Szymanowski











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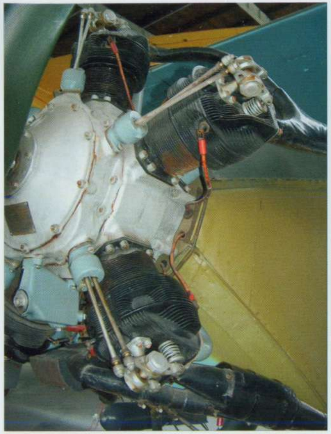
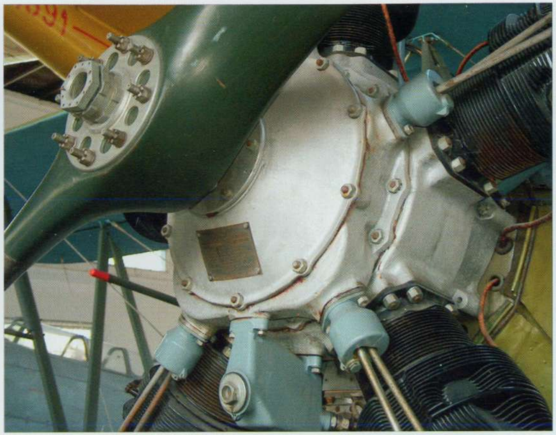
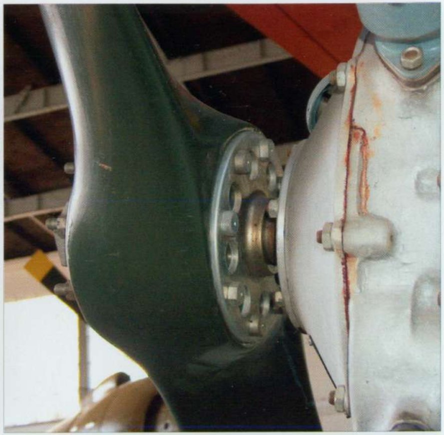
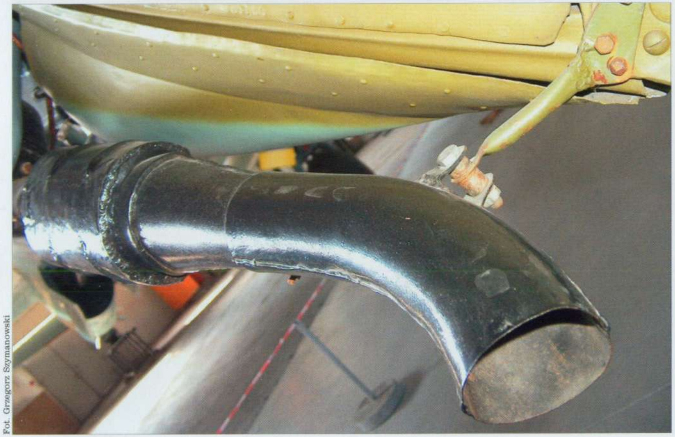
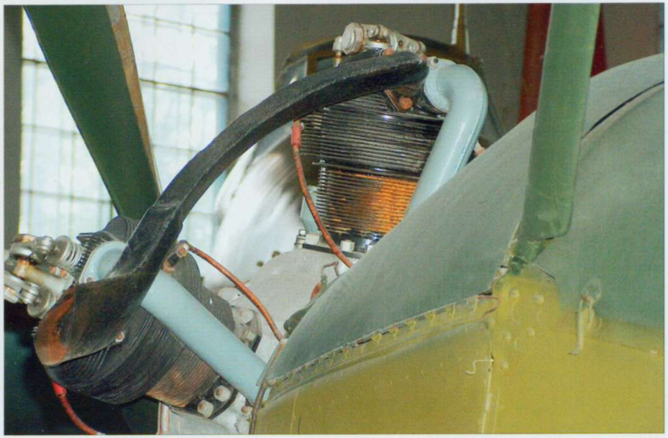
M-11D engine • Silnik M-11D



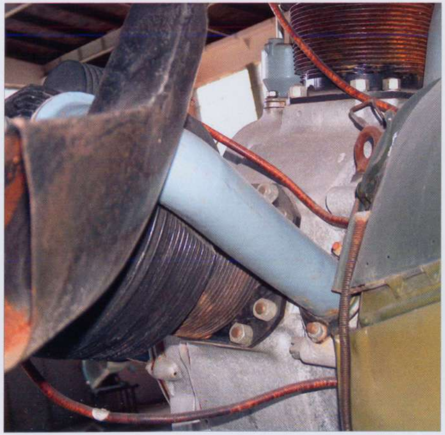


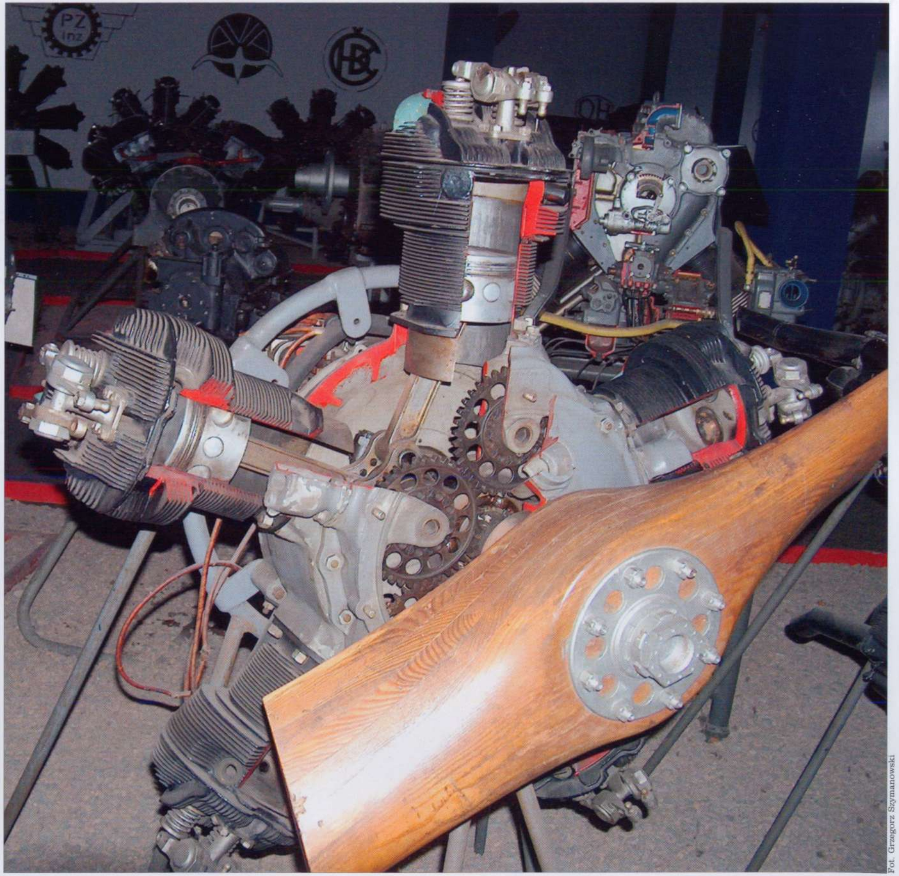






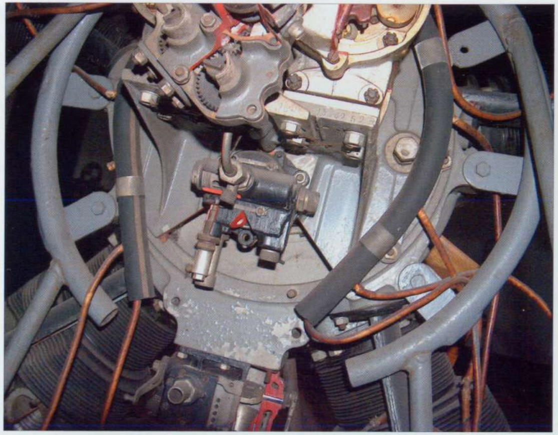
Fot. Grzegorz Szymanowski

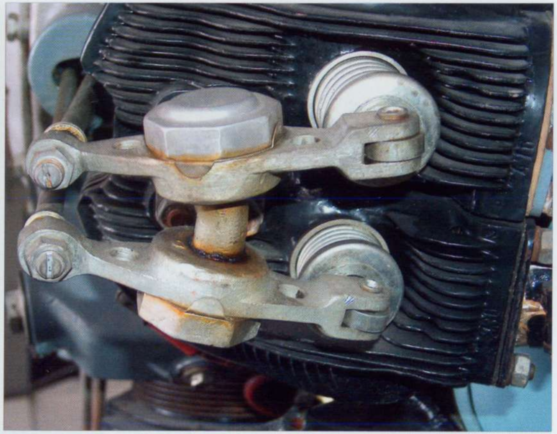


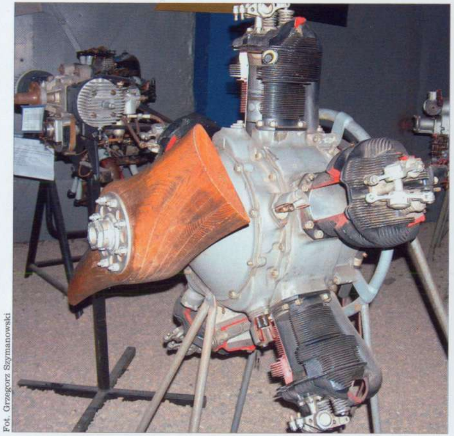


Fot. Grzegorz Szymanowski

The M-11 D Engine, exhibited in Muzeum Lotnictwa Polskiego. Note the cuts for didactic use and rear side of engine • Silnik M-11D, wystawiony w Muzeum Lotnictwa Polskiego







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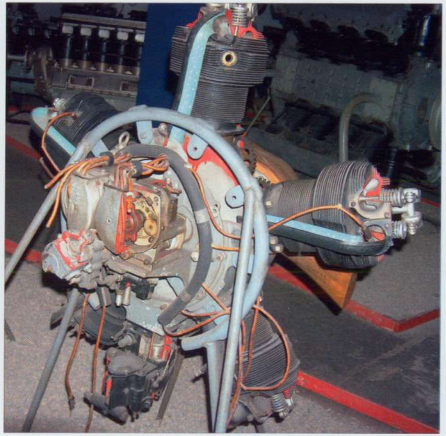
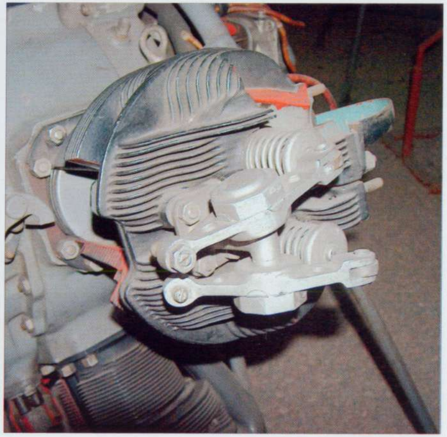
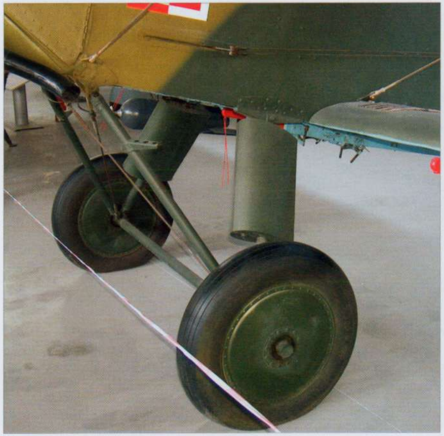
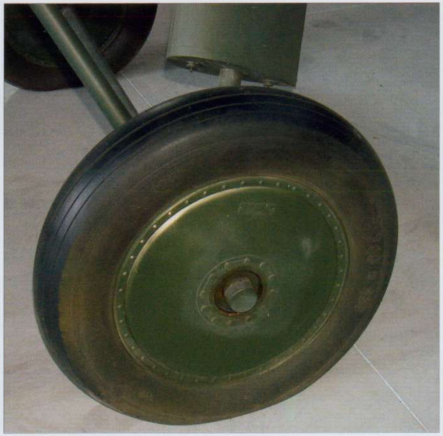
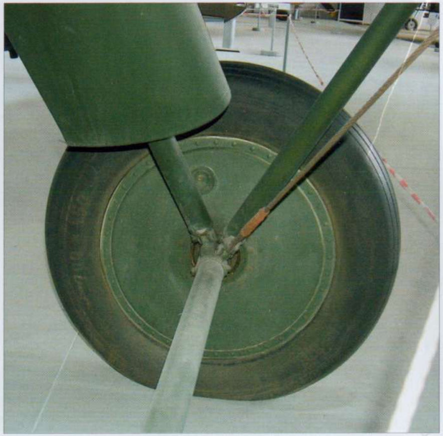
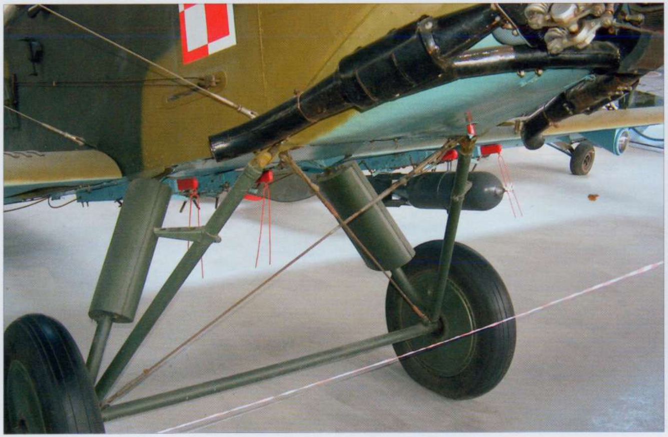


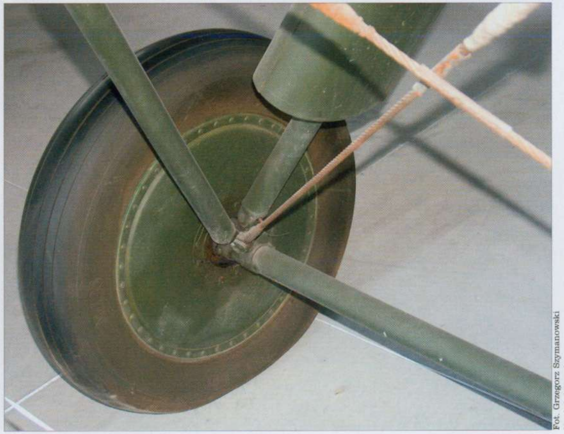






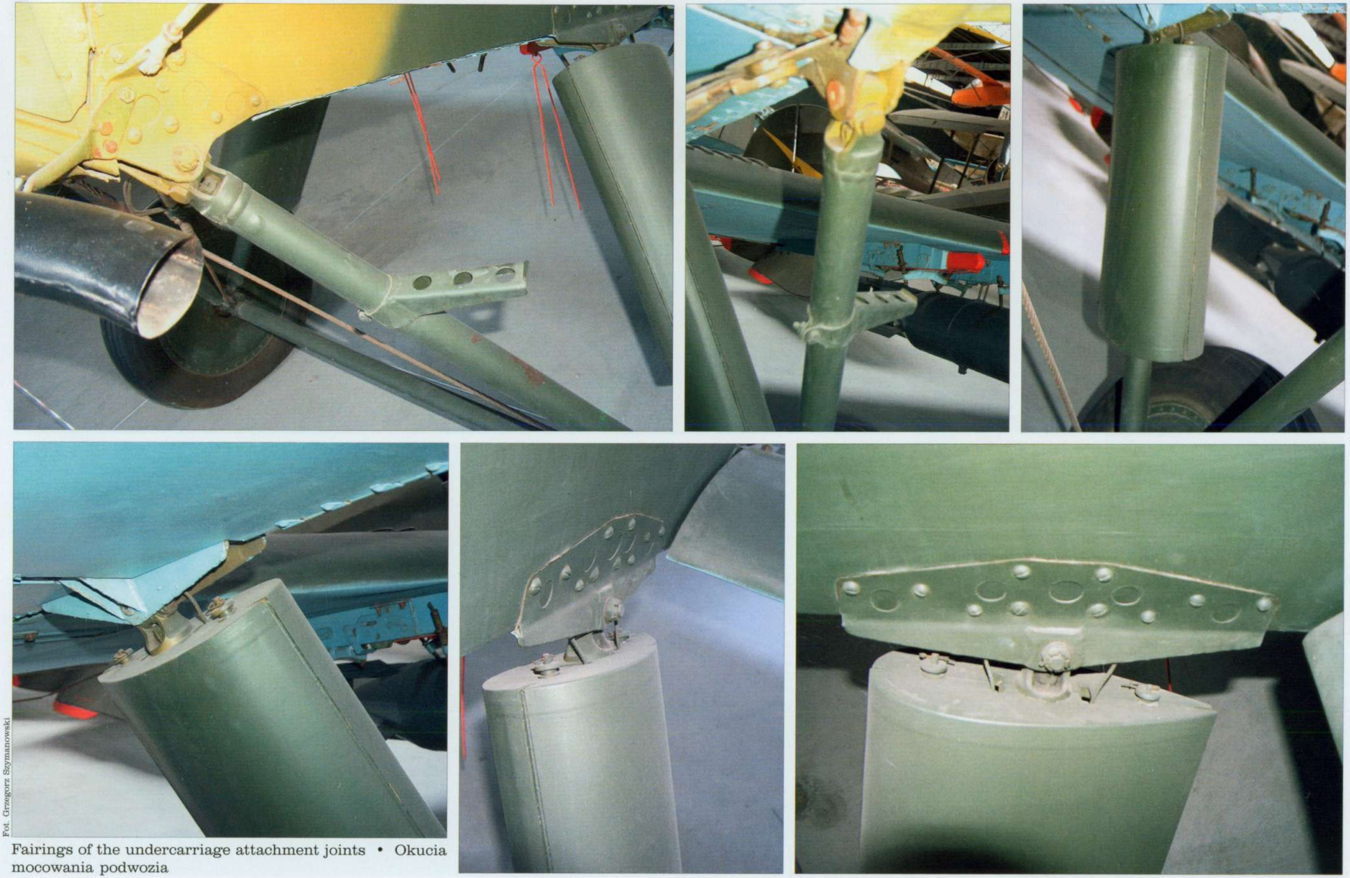






Fot. Grzegorz Szymanowski

Undercarriage • Podwozie samolotu



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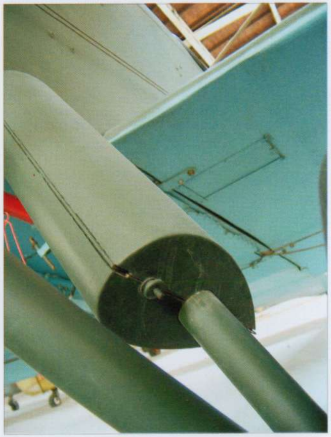
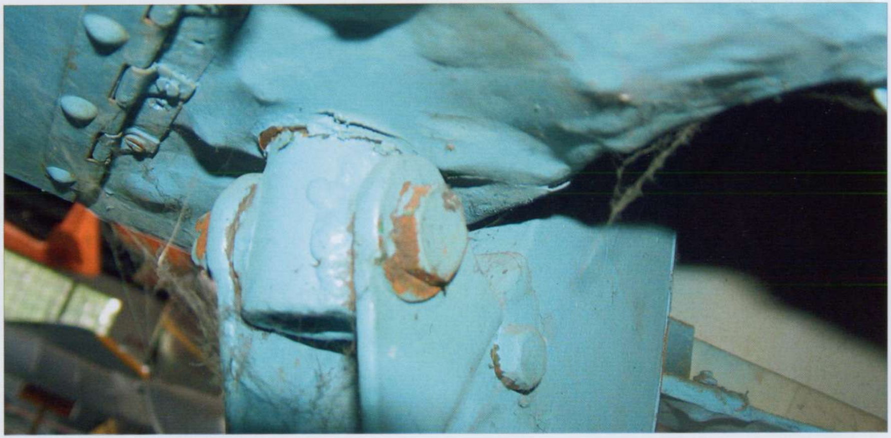
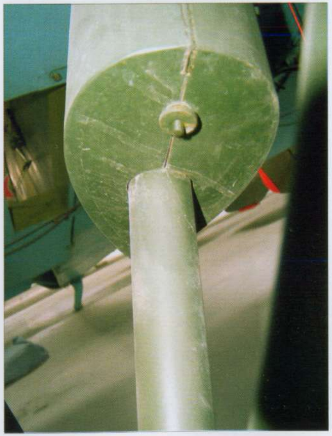
Fairings of the undercarriage attachment joints • Okucia mocowania podwozia

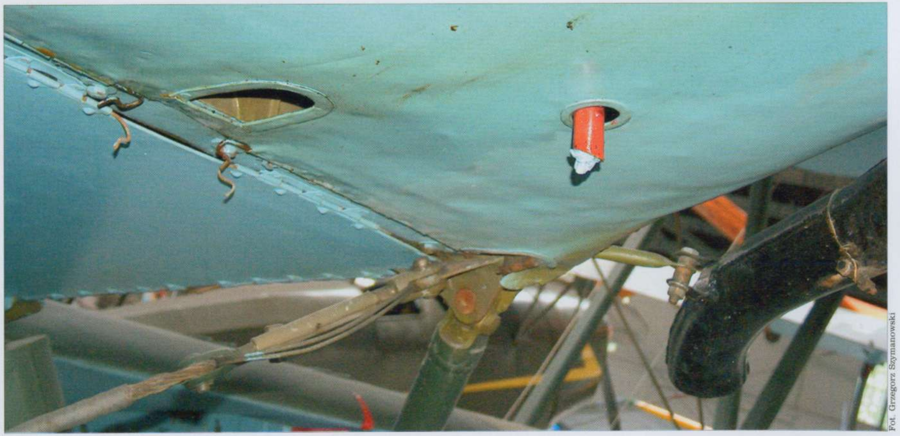


◄ Undercarriage • Podwozie samolotu



► Zawias płozy • Zawias płozy





► Bottom part of the fuselage, in time of flying was constantly sprayed by oil • Spód przodu kadłuba

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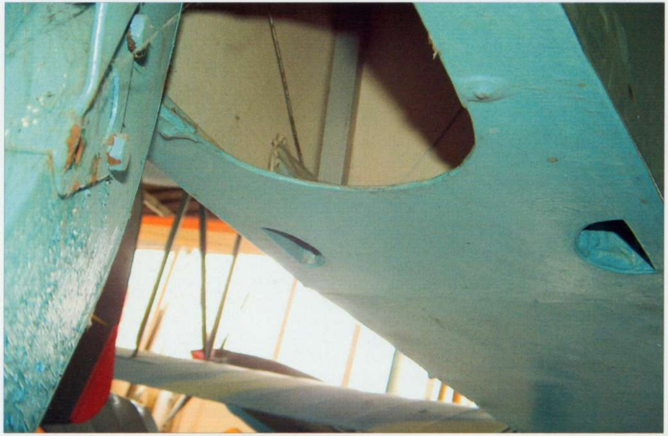
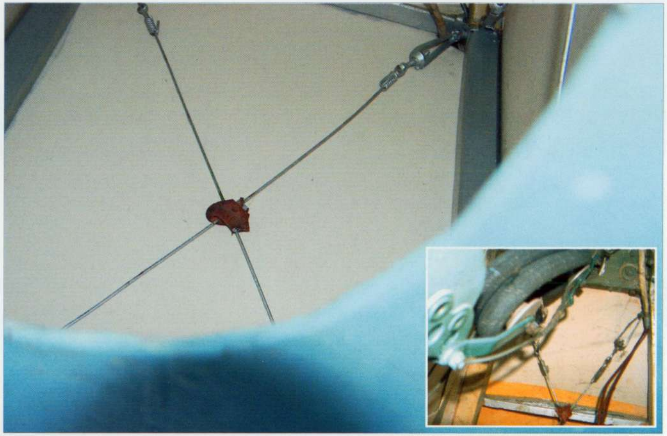
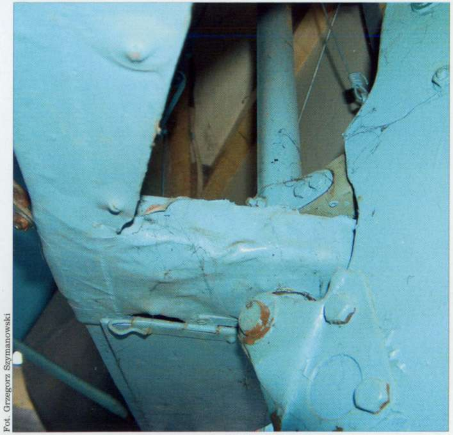
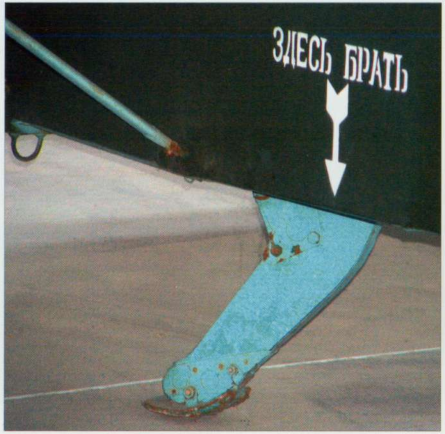
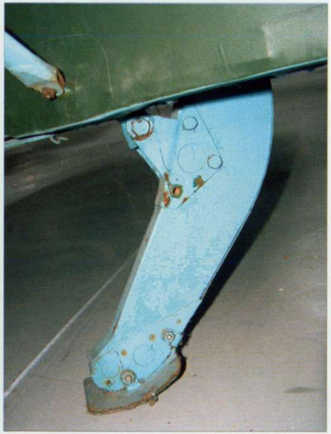






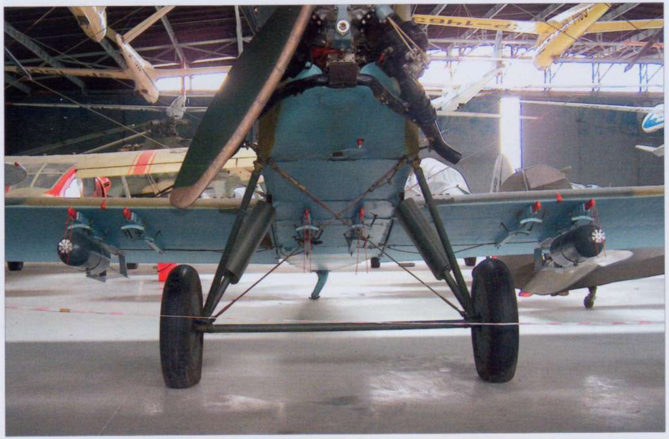
▲
The skid cavity and grips for lifting the fuselage • Wnęka płozy i uchwyty do unoszenia kadłuba

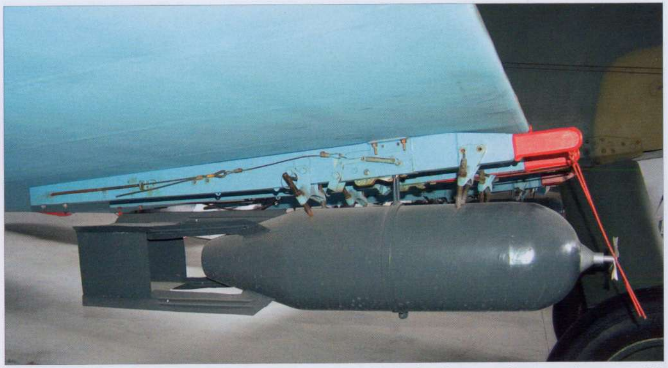




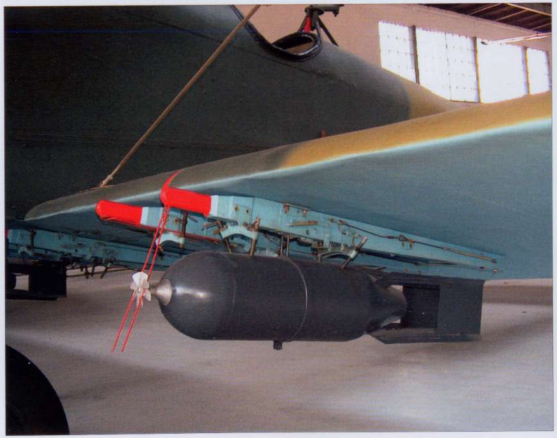
▶
The tail skid • Płoza ogonowa

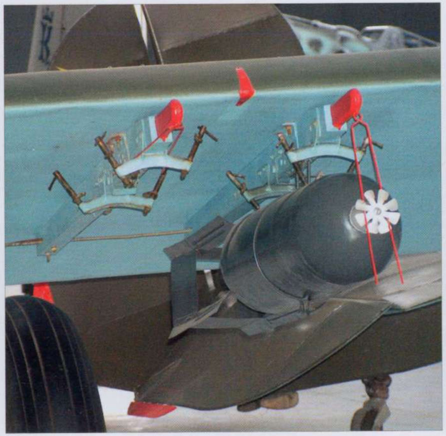
Fot. Grzegorz Szymanowski

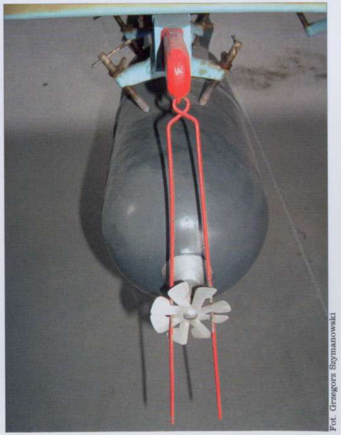




50 kg (ok. 240 lbs) bombs on underwing carrier. Underfuselage carriers can to carry 100 kg bombs. In this case plane was able to carry only 2 bombs weight 100 kg each other • Podwieszone na wyrzutnikach 50 kg bomby. Podkadłubowe wyrzutniki bombowe pozwalały na podwieszenie nawet 100 kg bomby. Wtedy samolot zabierał tylko 2 bomby po 100 kg







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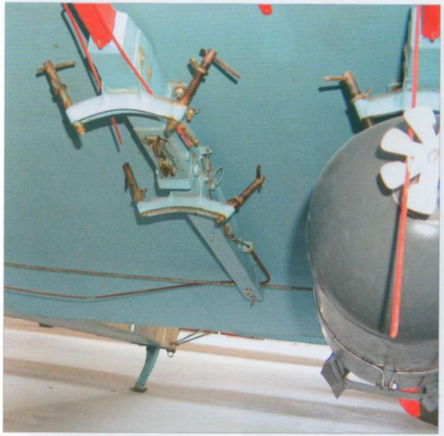

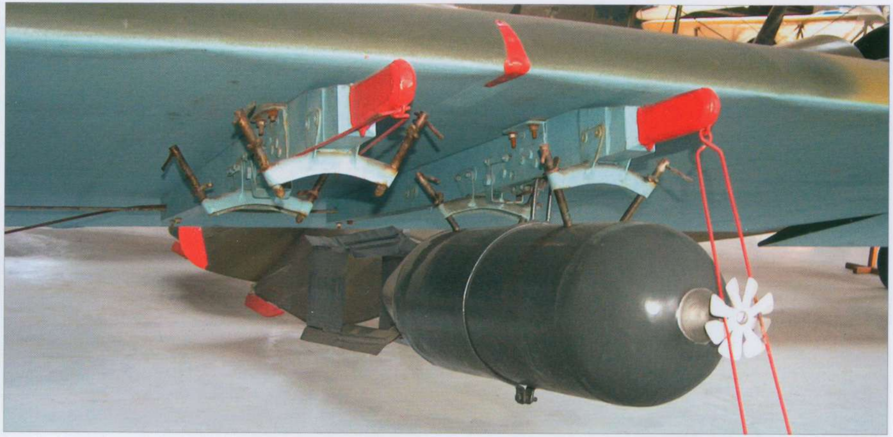

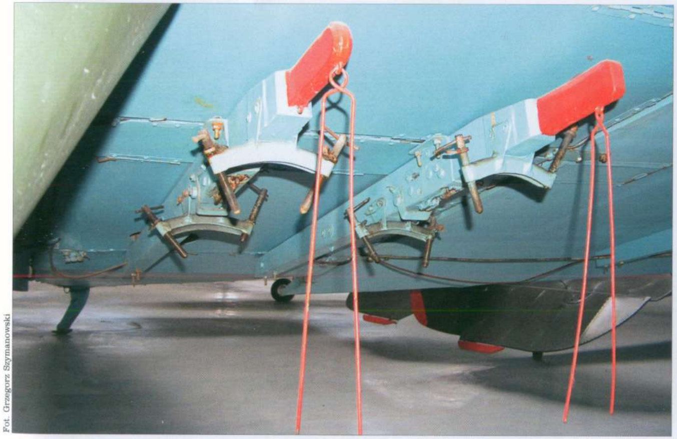

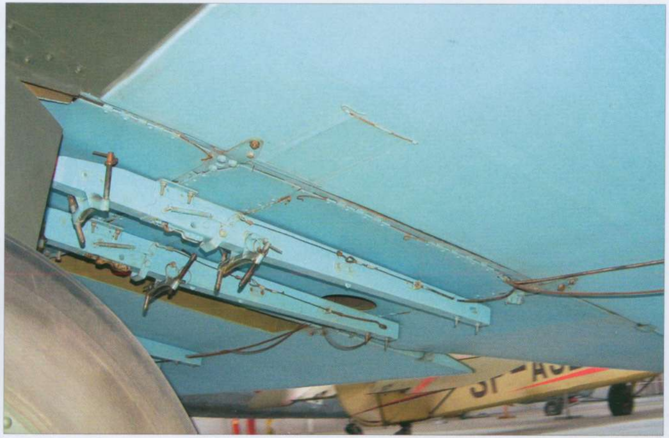

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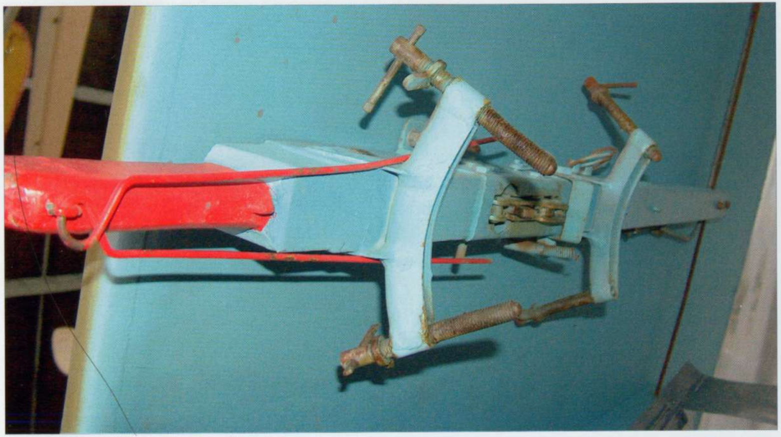
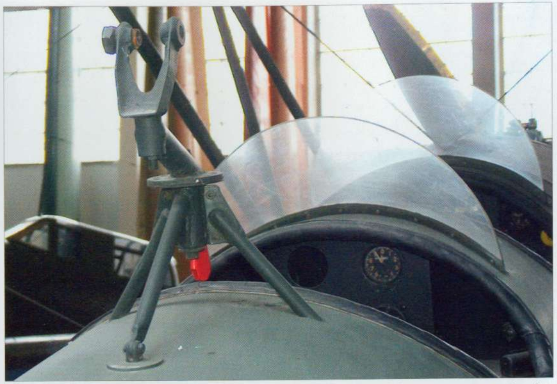
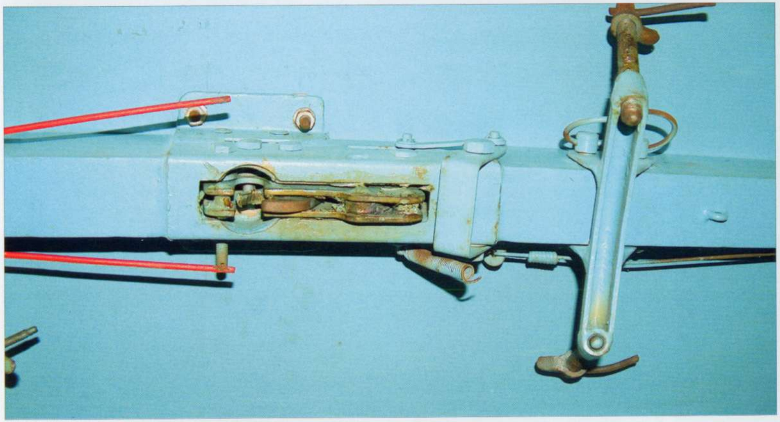
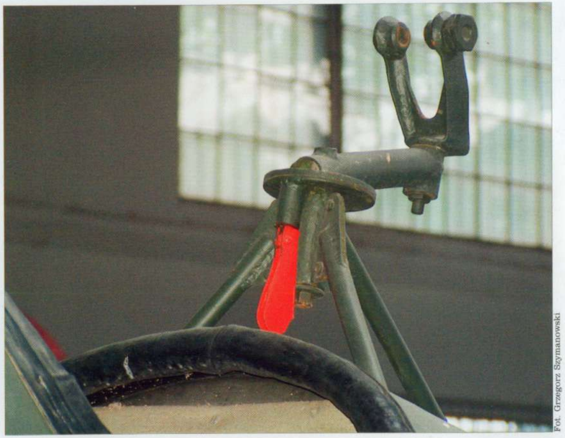




Fixed machinegun ShKAS base (lafete?). This machinegun was sole defence of the plane • Podstawa ruchomego km SzKAS 7,62 mm. Było to jedyne uzbrojenie obronne samolotu



Underfuselage carrier • Podkadłubowy wyrzutnik bombowy



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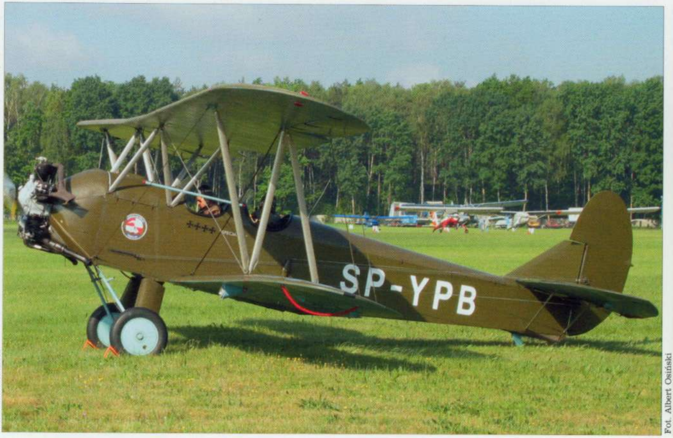

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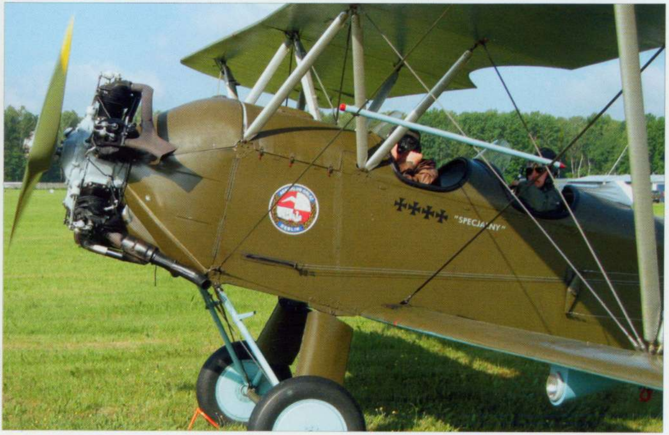

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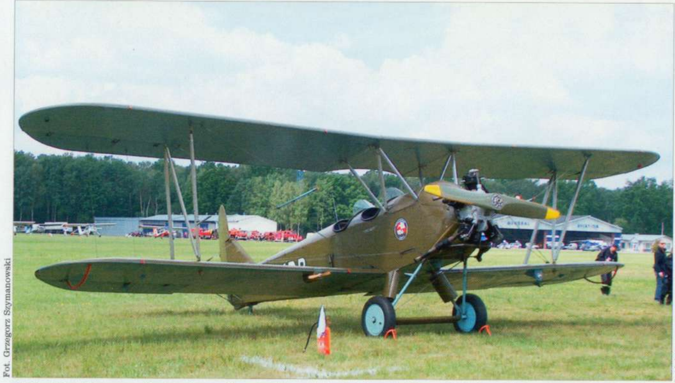

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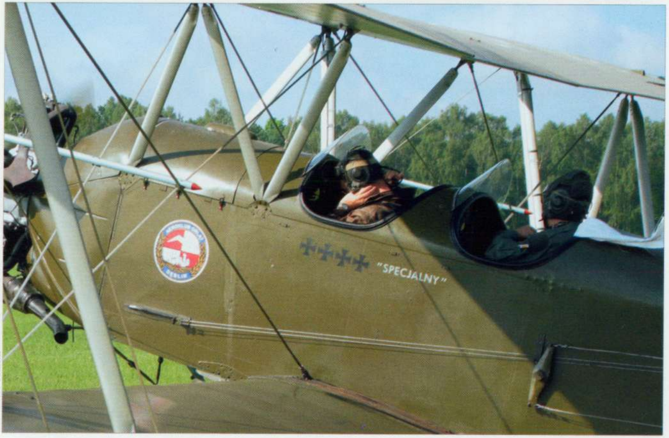
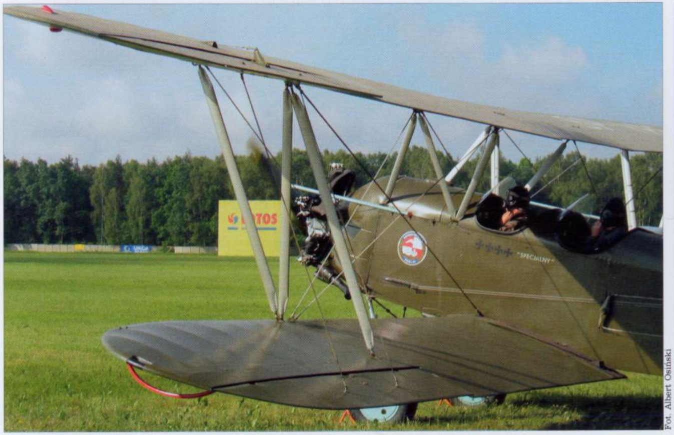


Fot. Albert Osiński

CSS-13 – licence Po-2 aircraft, produced in Poland after WWII, Góraszka airfield, June 2005. Property of Aeroklub Orląt, Dęblin • CSS-13 – licencyjny Po-2, produkowany po wojnie w Polsce



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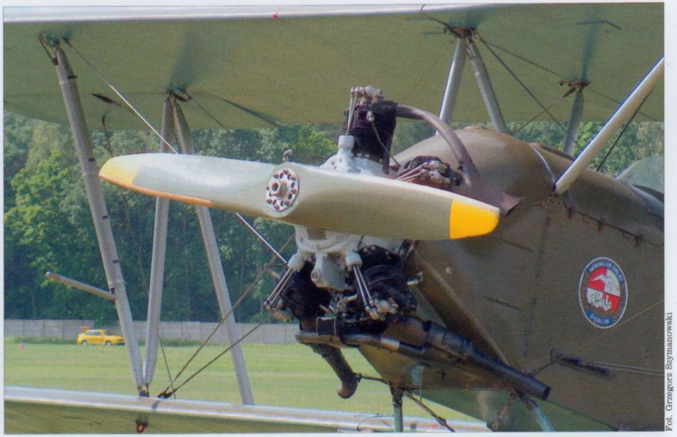

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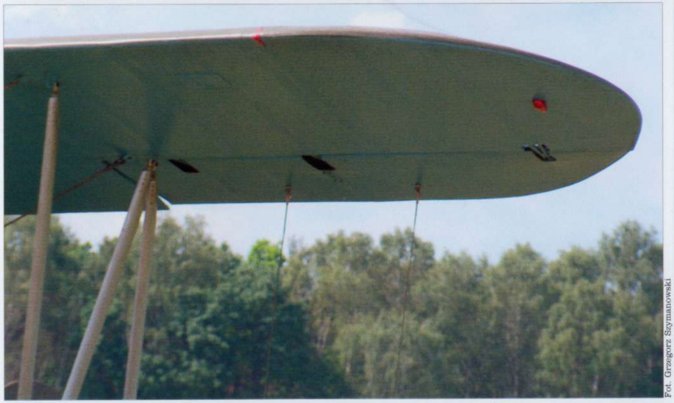

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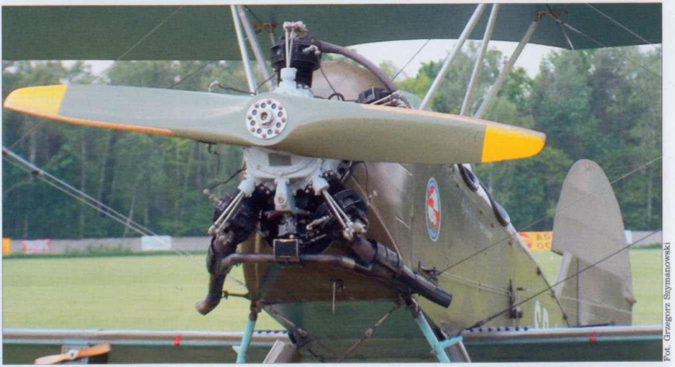
The aileron of the upper wing of CSS-13. Note p. 17 and 18 • Lewa lotka górnego płata CSS-13. Por. str. 17 i 18



Fot. Grzegorz Szymanowski

Engine and propeller in CSS-13. Used war version propeller, much less sophisticated than this in Po-2 from the Cracow Aviation Museum. Note p. 27 • Silnik i śmigło w licencyjnym CSS-13. Zastosowano śmigło w wersji uproszczonej, stosowanej w czasie wojny. Por. str. 27

Fot. Grzegorz Szymanowski

Technical data on Po-2

Dimensions	
Wingspan	11,4 m
Length	8,17 m
Hight	3,10 m
Wing area	33,15 m^2
Weight loaded	1368 kg
Performance	
Max. speed	130 km/h
Ceiling	
Maximum	3000 m
Service	1300 m
Range	350 km
Armament	
Machine gun	ShKAS, 7,62 mm
Bombs	6 x 50 kg or 2 x 100 kg

Two CSS-13 are flying over a forest. Low-attitude flying in late WWII gave Po-2 nickname "forester" • CSS-13 w locie nad Góraszką, czerwiec 2005 r.

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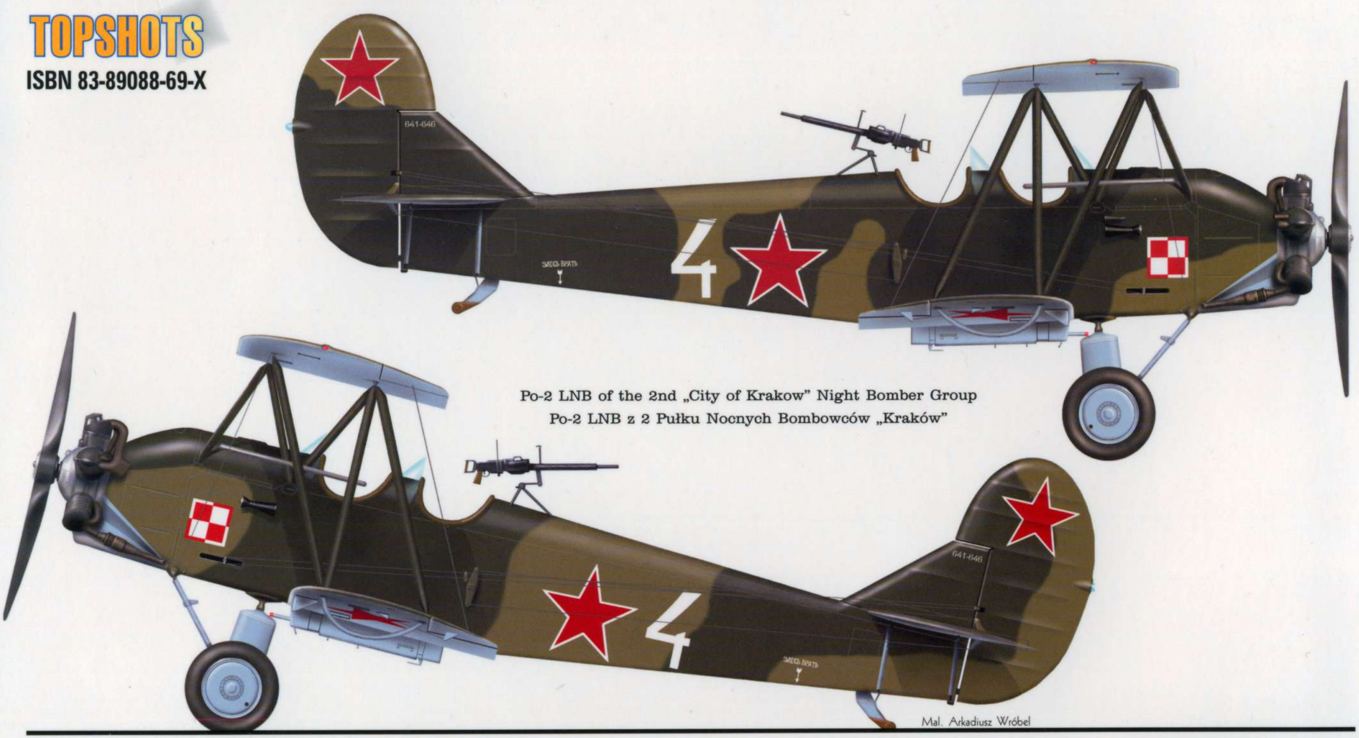

Po-2 LNB of the 2nd „City of Krakow" Night Bomber Group
Po-2 LNB z 2 Pułku Nocnych Bombowców „Kraków"

Mal. Arkadiusz Wróbel

The author of this book hereby would like to express his sincere appreciation to the Polish Aviation Museum, and especially to Mr. Jan Hoffman, for the kind reception and invaluable help offered in the research for this book

MUZEUM LOTNICTWA POLSKIEGO w KRAKOWIE
Al. Jana Pawła II 39, 30-969 Kraków
Phone/Fax (+48 12) 642 87 00 • http://www.muz-lotnictwa.krakow.pl